Indian Institute of Management, Calcutta
M. N. Dastur & Co. Private Ltd., Calcutta

SURVEY
of
INDIA'S EXPORT POTENTIAL
of
MACHINE TOOLS

October 1969

Vol. I (of three)

UNITED STATES OF AMERICA

AGENCY FOR INTERNATIONAL DEVELOPMENT

American Embassy, West Building, Chanakyapuri,
New Delhi-11, India

Telephone: 7 0 3 5 1
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December 1, 1969

Mr. S. K. Modwel
Deputy Secretary
Ministry of Foreign Trade and Supply
Government of India
Udyog Bhawan
New Delhi - 1

Dear Mr. Modwel:

Enclosed herewith are the required number of copies of the latest commodity survey entitled "India's Export Potential for Machine Tools." This is the latest in the series of studies commissioned by the Export Promotion Division of USAID under an operational program entered into with the Government of India. The survey was prepared by the Indian Institute of Management, Calcutta and M. N. Dastur Co., Calcutta.

The surveys which have been completed under this program include:

1) Fresh and Processed Fruits and Vegetables,
2) Spices,
3) Oilcakes and Allied Products and
4) Textiles and Made-Up Garments

A "functional" study of Overseas Transport and Freight Structure in Indian Overseas Transport has also been forwarded to your office. Other studies which are nearly completed under this program include:

1) Leather and Leather Products,
2) Jute and Jute Products,
3) Wood and Wood Products,
4) Shellac,
5) Marine Products and
6) Tobacco and Tobacco Products

In addition, four other functional surveys commissioned under this project in accordance with your Ministry's instructions are nearing completion. These are:

1) India's Export Potential within the Indian Ocean Basin,
2) Export Procedures and Documentation,
3) The Effectiveness of the Export Trading House as a Marketing Channel and its Applicability for India and
4) Domestic Transportation Problems of Export Cargo

Presentations of the preliminary findings of this survey have been made by the survey team both to industry and Government officials. A similar series of public presentations is scheduled to be made shortly for the study on Wood and Wood Products. This is in keeping with our normal practices. The purpose of these presentations is to permit rapid dissemination of the most relevant findings and recommendations of the study group and also to allow for some cross-examination of the study group to make certain that the questions uppermost in the minds of government and industry officials will be considered in the final report.

Several portions of the study appear to me to be deserving of particular attention, including, for example, the chapter on marketing strategy. In there the point is developed that it is best to promote basic types of Indian machine tools which have production techniques which are relatively labor intensive. The marketing strategy as presented also commendably suggests that promotional programs should be concentrated in a few countries with the best sales potential rather than spreading it among many markets. One subject in the report which may, however, require further study and analysis is a proposal to set up a Market Development Fund for the industry. Finally, I venture to suggest that although the report is exhaustive in scope it cannot serve as a substitute for market tours by producers.

Both the survey group and the USAID Mission have gone to great lengths to print and distribute this report rapidly so that it will be available for consideration while the data contained therein is still current. The report can now receive the attention it deserves so that such actions as the government and industry believe to be appropriate can be taken with the least practicable delay.

In this connection, may I call attention to the recommendation made during the presentation of findings to the government by the survey group on Fresh and Processed Fruits and Vegetables on May 31, 1968, and endorsed by Mr. K. B. Lall, that a task force be established under the chairmanship of the responsible technical ministry, with representation from each of the ministries, that would be given pertinent responsibilities in connection with implementation of the findings of the report. I heartily concur with this recommendation and hope such a task force can be established as quickly as possible for each of the survey reports.

I hope the material contained in these volumes will be useful to bring about an increase in India's foreign exchange earnings from machine tools. The U.S. Economic AID Mission stands ready to offer appropriate assistance in the implementation of these findings.

Sincerely yours,

Ludwig Rudel

Ludwig Rudel
Chief
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P-17, Mission Row Extension
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September 25, 1969

Mr Ludwig Rudel
Chief
Export Promotion Division
U.S. Agency for International Development
American Embassy
Chanakyapuri
New Delhi.

Dear Mr Rudel,

We have pleasure in transmitting the Report of the Survey of India's Export Potential for Machine Tools in accordance with the contract of the Indian Institute of Management, Calcutta and M.N. Dastur & Company Private Limited with the United States Agency for International Development under contract No. AID-386-1154 dated February 15, 1968.

The Report was prepared after a comprehensive survey of the machine tool industry in India and selected foreign countries. The preliminary findings of the survey were presented to the Indian machine tool industry at a seminar organised by the Indian Investment Centre in Bombay on October 18, 1968. The presentation was followed up with visits to a cross-section of Indian machine tool manufacturers to get additional data on various issues relevant to exports raised at the presentation.

A Summary Report was then prepared and presented to the Ministries of Foreign Trade and Industrial Development in New Delhi on June 13, 1969 under the Chairmanship of Mr N. Subramaniam, Additional Secretary of the Ministry of Industrial Development. Representatives of the Indian Machine Tool Manufacturers Association also attended this presentation.

The Government of India requested us at this presentation to have further discussions with the Indian Machine Tool Manufacturers Association and the Development Council for Machine Tools on several aspects of our report. These discussions were held in Bangalore on August 26, 1969.

Our Report consequently has been prepared in full consultation with the Government of India and the Indian machine tool industry with a view to take all relevant factors into consideration in evolving the recommendations and ensuring their feasibility in terms of implementation.

In conclusion, we would like to thank US AID and you in particular as the Chief of the Export Promotion Division for taking the initiative in sponsoring this study which, it is hoped, will assist the country's export effort.

Yours sincerely,

Krishna Mohan

Krishna Mohan
Director
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M.N. Dastur
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Calcutta

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SURVEY
OF
INDIA'S EXPORT POTENTIAL
OF
MACHINE TOOLS

Prepared under the sponsorship of
THE EXPORT PROMOTION DIVISION
U.S. Agency for International Development, New Delhi
for
THE MINISTRY OF FOREIGN TRADE AND SUPPLY
Government of India

INDIAN INSTITUTE OF MANAGEMENT, CALCUTTA
AND
M.N. DASTUR & CO. PRIVATE LTD., CALCUTTA

VOLUME I

THE INDIAN MACHINE TOOL INDUSTRY - SITUATION REPORT AND RECOMMENDATIONS FOR AN EXPORT STRATEGY

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Synopsis

1. India's machine tool exports have risen from Rs 67 lakhs in 1967-68 to Rs 104 lakhs during the first 8 months of 1968-69 and are expected to reach Rs 150 lakhs, an increase of over 100% and a favourable augury for future expansion.

The Export Target

2. The survey indicates that an export target of Rs 7.5 crores is feasible by 1973-74 and Rs 15 crores by 1975-76. Actually, the potential for exports of this order exists now. However, the machine tool industry has to undertake considerable preparatory work to realise this potential in terms of product development, establishing distributor networks in export markets and advertising. Once a marketing base has been established in export markets, sales should expand rapidly in future years.

3. Japan's example is instructive. Japan was a late starter in the international market for machine tools and its export drive began in 1960. The entry into foreign markets was preceded by 4 to 5 years of preparatory work in market research and product development. In 1960 a vigorous promotional effort was launched, with expenditures on advertising in the U.S. alone exceeding $600,000 per annum. The breakthrough came in 1963. Subsequently sales have risen very fast. from $1.4 million in 1959 to $11.9 million in 1963 and $51.7 million in 1967.

The World Market

4. International trade in machine tools has doubled in the last decade to $1600 in 1967. On a world wide basis, users now import a

quarter of their $6000 million annual requirement. Because of continuing increase in demand in both developed and developing countries; rising machine tool production costs in industrially advanced countries; and further reduction of relatively low trade barriers by the Kennedy Round, the potential for exports is increasing. The substantial imports of the major producers of machine tools is indicated by their percentage of imported machine tools : Switzerland 50%; U.K. 34%; Czechoslovakia 32%; France 37%; West Germany 13%; and U.S.A. 11%.

5. The imports of the U.S., which accounts for a third of world demand for machine tools, have increased 390% between 1964 and 1967. The exports to the U.S. of individual countries rose as follows during this period : West Germany 302%; U.K. 438%; Japan 1210% and Italy 902%.

6. The international economic environment is very favourable for exporting Indian machine tools if India can develop and execute an effective marketing strategy in selecting target markets and target products and taking the lines of marketing action needed in product development, distribution, advertising and pricing.

The Target Markets

7. Segmenting the global market, the following six countries are recommended as the first priority target markets for Indian machine tools:

Countries	Total Market (Millions of $)	Share of World Market %	Imports (Millions of $)	Share of World Imports %
U.S.A.	1852	30.9	178	11.1
Canada	118	1.9	104	6.5
U.K.	465	7.7	154	9.6
West Germany	438	7.3	58	3.6
France	315	5.3	117	7.3
Australia	61	1.0	37	2.3
TOTAL	3249	54.1	648	40.[illegible]

8. These six countries account for 54% of the world market for machine tools and 40% of world imports. Within this group, the prime target is the U.S. There are several reasons for their priority in India's export drive:

a) Their sheer size and diversity provides scope for selective segmentation to carve a share for Indian exporters through appropriate product development. This was the strategy followed by Volkswagen, which focussed on a small consumer group in the U.S. who wanted a small economical car. It was only 1% of the U.S. automobile market at the time but it represented 100,000 cars.

b) The size of these markets ensures that a small share produces substantial export earnings. Japan's 1.4% share of the U.S. market represents 45% of her total exports.

c) The increasing costs of production in these markets and the trend in their domestic manufacture towards sophisticated automatic and numerically controlled machine tools open opportunities for the small, conventional, general purpose models that India is best equipped to supply.

d) The facility of an installed marketing infra-structure of distributor networks and advertising and promotional media enables speedy and economical market penetration.

e) The fact that customers are well financed and do not require credit. In the U.S., customers pay within 90 days of delivery.

9. The six countries will yield the best return on marketing investment in volume of sales and profits and, therefore, should have corresponding priority in the export drive.

10. The second priority markets in terms of both attention and investment in market development are Benelux, Switzerland, Sweden, and Denmark in Western Europe and the Comecon countries of U.S.S.R., Czechoslovakia, Poland and East Germany. These eight countries

contribute 24% of world demand for machine tools and 22% of world imports. These markets are in the second priority because the Western European countries are small and each requires an individual marketing operation which increases costs and reduces profitability. The Comecon countries are only accessible through centralised state agencies. The restricted contact with end users and limited distribution and promotional facilities inhibits market development. They merit attention only after the first priority markets are developed.

11. The developing countries have third priority in the export drive. Though they have a rising demand for machine tools, they only account for 20% of world imports fragmented among 100 odd countries. This increases marketing costs in relation to potential. Further, they do not have a marketing infra-structure - trained distributors, advertising media, etc. - and this makes market development difficult. For these reasons, marketing investment must be scaled to their limited potential and profitability.

12. Countries like Brazil, Mexico, Argentina, and even Japan and Italy, are unpromising markets because Indian machine tools have no comparative advantage over their own products. In fact, they are India's major competitors in international markets. Any marketing effort in these countries is not likely to produce results.

The Target Products

13. The products which offer promising prospects of export sales, especially in the first priority markets, are conventional general purpose machine tools which sell to the final customer at $2000 to $8000 with adequate attachments to enable versatility in utilisation. The specific machine tool types for the export drive are:-

Category	Specific Type
a) Lathes	Centre (swing over bed 11" to 21"; 30" to 60" between centres)
b) Lathes	Turret
c) Milling machines	Knee Type
d) Drilling machines	Radial
e) Drilling machines	Column
f) Grinding machines	Cylindrical
g) Surface grinders	
h) Tool and Cutter grinders	

14. Incidentally, the size of the market in the six priority countries for the above product range is $199 million per annum. India's export target of Rs 7.5 crores, in 1973-74, is a 4% share of this segment of the total market.

15. Specific makes in the target product range will be machine tools like HMT's LB, H, L, M, E, RM and G lines, Mysore Kirloskar centre lathes, and similar models.

16. Before proceeding to the design modifications essential for their acceptability in export markets, the lines which cannot be exported should be discussed.

17. The premium on high output per worker in export markets rules out low productivity machine tools like planers, shapers and slotters.

18. Collaboration agreements prevent the export of a whole range of machine tools which otherwise would have export potential. The only solution is either renegotiation of collaboration agreements to permit exports, at least to selected countries, or substantially higher royalty premiums than the current after-tax 2-3% of export sales value.

Export-oriented Product Development

19. The target products need to be adapted, modified and redesigned in line with end-user requirements in export markets before sales can be developed. The product development needed is within the technical capacity of the Indian machine tool industry. The gap at present is lack of knowledge of end-user requirements, which means investment in market research in export markets, and the technical willingness to respond in terms of design, performance and other changes. Export-oriented product development is a vital pre-requisite before the export drive is launched in foreign markets. Any investment in market development and promotion before the product line is ready for export markets would be infructuous. The gestation period for field research and product development, a minimum of two to three years, is the main reason why the export drive will not yield major results till 1973-74 and beyond. A major reason that the export target will be accounted for principally by HMT and Mysore Kirloskar is that they have already adapted some of their machines for exports.

20. The nature of design modifications needed are higher speed ranges (e.g. to 30-1500 RPM in case of the HMT M2 milling machine); redesigned spindles for higher accuracy; electric current specifications and safety requirements (e.g. interlocks on motors) in conformity with those prevalent in the export markets; hardening of guideways on lathes beds and cross-fed screws; camlock design spindle noses; left handed hand wheels and tail-stock screws and the like, all of which are technically feasible but which require detailed knowledge of end-user needs.

21. Another important factory guiding product development should be the needs of the target customer in terms of versatility of operation. The small conventional general purposes machine tools

comprising the target product group will be mainly bought by:-

a) Small lot sub-contracting shops
b) Repair and maintenance shops of plants
c) Vocational training institutions.

22. These customers do not by their nature undertake bulk manufacture of standard items. The jobs they undertake are small in volume and versatile in nature. Therefore, they need to be equipped with a range of attachments to cater to the varied demands made on them. This again requires end-user research and product development.

Competition

23. The main competition that Indian machine tools will face will be second-hand reconditioned U.S. machine tools or low-priced imported machine tools, mainly Japanese and Italian makes. Indian machine tools must also have a price advantage - initially 20% below the level of the lowest foreign competitor - to make an entry into the priority export markets. The feasibility and economics of this level of pricing are discussed elsewhere.

Distributors

24. The nature, size and dispersion of the customer universe - small plants in the U.S. alone total 80,000 - makes reliance on established and experienced regional distributors essential for sales and after-sales service. Otherwise, local field forces will have to be hired which will be prohibitively expensive. Distributors of this calibre can only be interested in representing Indian machine tools if (a) they develop confidence in the quality of our products and (b) if they earn a substantially higher commission on sales - about 35% of turnover, compared to 20% given by the Japanese and 10% by U.S. manufacturers. The economics are discussed in a later section on pricing.

25. Obtaining the confidence of distributors requires education through participation in exhibitions, advertising, and most important, personal visits to India. The best advertisement for the Indian machine tool industry is personal exposure to its exceptional technical resources and competence.

Investment in Market Development

26. Market development - marketing research, distributor stimulation and advertising through trade journals - must begin now if the target is to be achieved in 1973-74. The expenditures must be regarded as a capital investment to develop sales and amortised on a long term basis. Therefore, the present policy of releasing foreign exchange for market development on the basis of past sales needs to be drastically revised. Further, expenditures must be concentrated in the priority markets where the investment will yield best results. Expenditures of Rs 33 lakhs per annum from 1969-70 are proposed, rising to Rs 37.5 lakhs per annum from 1972-73 onwards, distributed as follows in the initial years :-

		(Rs in lakhs)
a) Participation in exhibitions	..	7.5
b) Advertising in trade journals	..	3.4
c) Visits to India of foreign distributors		2.3
d) Visits of Indian technical and marketing personnel to U.S.	..	5.0
e) Contract market research abroad	..	3.8
f) Overseas offices, show rooms and warehouses	..	11.3
		33.3

The proposed expenditure on market development of Rs 33 lakhs to Rs 37.5 lakhs per annum are the minimum levels necessary for the export drive to gather momentum. Export sales are a function of promotional expenditures. There is justification for budgeting for expenditures at the rate of Rs 50 lakhs per annum on market development to give greater impetus to exports.

27. In the initial years, major expenditures should be concentrated on contract marketing research and overseas surveys by the industry supplemented with visits to India of potential distributors. Except for a limited range of products from companies like HMT, Mysore Kirloskar, Telco, etc, it would not serve much purpose to exhibit in trade fairs and advertise before the product line and distribution system is ready. The emphasis can shift to promotion and advertising after this pre-condition is met. If sales rise as forecast from Rs 1.5 crores in 1968-69 to Rs 7.5 crores in 1973-74, market development expenditures of Rs 33 to Rs 37 lakhs per annum over the period will be 7.5% of sales. After sales cross this level, the ratio will fall to 5%, which, incidentally, is what the Czechs spend annually on sales promotion.

Market Development Fund

28. The resources of the Market Development Fund, which have been increased to Rs 40 crores in 1968-69 from Rs 24 crores in 1967-68, are available to aid the export effort, especially in foreign exchange. The quantum of aid possible from the MDF can be seen from the following table:

			Percentage of costs borne by MDF
(i)	Trade delegations, study teams and invited foreign delegations	-	50 to 75%
(ii)	Market Studies	-	50 to 100%
(iii)	Export Publicity	-	33 to 100%
(iv)	Foreign Officers of approved organizations	-	(75% for first 3 yrs (25% for next 2 yrs
(v)	Foreign Warehouses	-	25% for first 3 yrs
(vi)	Research and Product Development	-	50 to 75%

There is need for simplification of Government procedures so that bonafide exporters can avail of these facilities. Further, the policy in utilising the Fund should be governed by the following practical considerations.

29. Firstly, the MDF should be used entrepreneurially to develop sales and not as a reward for past sales. The latter policy puts the cart before the horse. The Reserve Bank also needs to be persuaded to take the same view in releasing foreign exchange for export sales promotion. Secondly, they should support only those machine tools which have been adapted to meet end-user requirements in export markets. Only those manufacturers should be backed who have undertaken product development on the basis of overseas marketing research. Finally, with regard to manufacturers who do not have a product range acceptable in export markets, support should be mainly for overseas market research.

Overseas Marketing Organisation

30. Regional distributors, provided experienced and established parties can be interested in representing Indian machine tools, should be the primary agency for overseas marketing. It is essential that they are complemented with a small cell of Indian technical and marketing personnel to oversee the operation and furnish the plants at home with market intelligence.

Indian vs. Local Brand Names

31. India has the choice of following the policy of the Japanese and market its products under Indian brand names. Alternatively, it can adopt the Italian policy of manufacturing to the order of local distributors, who sell the products with their own brand names and, also, bear the full marketing expenses.

32. The Japanese policy is expensive in terms of market development costs but offers long term security in that it creates a solid marketing base and customer franchise. HMT and Mysore Kirloskar have opted for this policy.

33. The Italian policy is economical but contains the long-term danger that the local distributor may shift to a competing country if that becomes a cheaper source of supply. This policy may be suitable for smaller manufacturers who do not wish to risk large sums in market development.

Pricing

34. Indian machine tools, which are unknown in export markets and have the further disadvantage that India does not have a reputation for supplying high quality engineering goods, need a substantial price advantage to compete with established domestic and imported makes. The price advantage should be 20% below the cheapest competitor. The cost structure of Indian machine tools combined with subsidies makes this price policy feasible.

Government Subsidy

35. The Government subsidy at present is of the order of 35% to 39% of F.O.B. value as follows:

a) Cash subsidy	20%
b) Incentive if exports exceed previous years' level by 10%	5%
c) Import Replenishment	4%
d) Drawback of duty and Central Excise	2 to 6%
e) Drawback of price differential of iron and steel	1%
	32% to 36%

36. In the countries which have achieved the greatest success in exporting machine tools, fiscal incentives in the form of cash subsidies, concessional prices of inputs and import privileges play a minor role. Government aid in these countries is mainly through subsidising overseas marketing research and advertising and furnishing export credit.

37. In the current situation of excess capacity, an export price which, with the subsidy, exceeds the variable costs helps to reduce losses by covering part of the overheads.

38. A cost analysis of three medium weight conventional machine tools indicates that it would be possible to price them 20% below competition and still cover variable costs and 50% of overheads in 1968-69. By 1973-74, there ought to be a profit on the assumption that Indian machine tools would be sufficiently well established to reduce the price discount and extra distributor commissions to 10% and that the industry would have a 25% increase in productivity by that time.

39. The following table (on page 13) analyses the costs and prices.

40. It can be seen that even at 1968-69 prices a significant recovery of overheads is made. By 1973-74, if the assumptions made are realised, there will be a profit. Exports can and must be profitable in the long run.

Profit Analysis for Exporting an Indian Machine Tool to the U.S. Market

	1968/69		1973/74	
	Rs	Rs	Rs	Rs
Price of competing foreign machine to US end-user		22,686		21,677(1)
Price discount of Indian machine	4,537 (20%)		2,166 (10%)	
Price of Indian machine to US end-user		18,149		19,511
Commissions to distributor of foreign machine	5,731		5,734	
Additional Commissions on Indian machine	1,145 (20%)		577 (10%)	
CIF duty-paid price of Indian machine		11,273		13,199
Tariff	1,253 (12.5%)		919 (7.5%)	
CIF price of Indian machine		10,020		12,280
Freight and Insurance	2,280		2,280	
FOB price of Indian machine		7,740		10,000
Cash subsidy, 20%(2)	+ 1,548		+ 2,000	
Import Replenishment	+ 310		+ 400	
Drawback of duty and excise and subsidy for iron and steel price	+ 301		+ 301	
Export packing, inland freight (after concession), handling etc.	- 760		- 760	
Export marketing cost	- 500		- 500	
Ex-factory revenue by manufacturer		8,639		11,441
Cost of materials, components, labour	6,377		6,101	
Return on export after deduction of material and labour costs		2,262		5,340
Overhead costs				
At normal capacity	5,105			
After 25% increase in productivity			4,083	
Return on equity before tax after recovery of all costs		- 2,843		1,257

(1) Prices will be reduced by 5% because of the reduction in tariffs by the Kennedy round.

(2) The subsidy will be supplemented by an additional 5% if the manufacturer concerned increases exports by 10% over the level achieved in the previous year.

Export Target

41. On the basis of the export marketing strategy suggested, the target for 1973-74 would be as follows:

	No. of Machines	Average value F.O.B.		Total value F.O.B.	
		$	Rs	Millions of $	Lakhs of Rs
I. Firs Priority Markets:					
i) HMT present export range	1,250	5000	37,500	6.25	469
ii) Mysore Kirloskar present export range	615	1700	12,767	1.05	79
iii) Machine tools of other manufacturers	500	2400	18,024	1.20	90
iv) Total	2,365	3598	27,021	8.50	638
II. Other Markets	1,000	1500	11,265	1.50	113
III. Grand Total	3,565	2972	22,319	10.00	751

42. A detailed breakdown by type of machine tool and country can be seen on page 62 (Table 2) of the summary report.

Production Capacity for Export

43. The production capacity for machine tools in 1973-74 on the basis of plant and equipment installed, balancing equipment, and new units already committed will be sufficient to produce Rs 15 crores

of machine tools for export. Moreover, the excess capacity is distributed virtually throughout the industry, and the firms which have the greatest export potential and which will account for the bulk of the exports may have sufficient excess capacity to meet the target of Rs 7.5 crores, particularly if they raise their productivity. As a result, during the Fourth Plan, production capacity may not restrict the level of exports. In case expansion of capacity is necessary, this would not have to be undertaken until later in the Fourth Plan:

	Existing Capacity 1968-69 Rs crores	With Balancing equipment Rs crores	With Balancing Equipment and Committed New Units Rs crores
Private Sector	23.0	28.0	28.0
Public Sector	38.0	38.0	48.0
TOTAL	61.0	66.0	76.0

It will be possible to achieve an output of Rs 76 crores in 1973/74. It is anticipated that annual demand for machine tools will at most be equal to the level of capacity, and that 25% of this, or Rs 19 crores, will be met by imports. Allowing for the difference of domestic and export prices, this means that an annual production capacity of about Rs 15 crores, including Rs 7.5 crores in firms with export potential, will be available for export, without any additional investment that is not already committed other than balancing equipment.

Foreign Exchange Costs of the Export Drive

44. The major cost in foreign exchange for the export drive will be market development expenses abroad. Because of excess production capacity, very little foreign exchange will be needed for import of machinery. Only some balancing equipment will have to be imported, which is needed for domestic production anyway.

45. If foreign know-how is used, there will be a royalty incidence of $2\frac{1}{2} - 3\frac{1}{2}\%$ of the value of output in foreign exchange. In case collaboration agreements can be amended to permit exports to foreign markets against higher royalties, there will be an additional incidence in foreign exchange. However, this will be amply recompensed in foreign exchange earnings from sales. Incidentally, there is no outflow of foreign exchange to collaborators on the bulk of the specific machine tools included in the target product range for the export drive.

46. The import of direct and indirect current inputs for machine tool production for export would not average more than 10% of F.O.B. value. The direct import content of the specific machine tools in the target product range to be exported initially is only 3 to 8% of FOB value. As India starts exporting more sophisticated machine tools, the import content will tend to increase. Electro-magnetic clutches, relays and other special requirements of export markets will need to be imported. However, to reiterate, the direct and indirect import content is not likely to exceed 10% of FOB value on the average.

Problems to be Solved

47. The export potential as well as the domestic prosperity of the machine tool industry will be enhanced if certain difficulties are removed and certain problems are solved. The main problem areas

beyond those covered earlier in this report are listed below:

a) Quality control: The present system of grading machine tools in India has no relation to the quality standards required for export. Grading is based on geometric accuracy but does not take into account materials workmanship, design and other features which determine the productivity of the machine or the durability of the machine and its accuracy. The present grading system ought to be replaced by a more thorough export oriented quality standard. The Central Machine Tool Institute (CMTI) could develop the standard but enforcement will be the responsibility of the industry.

b) Increasing productivity: There is scope for a 25% increase in productivity through using the techniques of management science in operating plants and better training of workers.

   The survey indicated that rationalisation of production methods through increasing batch sizes to distribute setting time and complementary standardisation of components can increase efficiency substantially. The possibilities are indicated by a recent rationalisation exercise conducted by HMT which reduced the number of required components by 50%. This is another area where CMTI could be of great assistance to the industry.

   The availability of economical skilled labour gives a potentially immense cost advantage to the industry. This advantage could be enhanced if the productivity of labour, which often yields only a third of the output abroad, could be improved by a greater investment in training.

c) The inadequate managerial and other resources of the Indian machine tool industry in the areas of design and marketing: The design and marketing inputs required for export are very high; they are also needed for developing the domestic market. One of the most striking differences between the Indian machine tool industry and its counterparts abroad is the significantly lower proportion of resources devoted to basic research, design development and marketing domestically and abroad. The industry needs to increase these resources.

d) The rudimentary supply network for parts and components in India in the context of restrictions on the import of such items of required quality: This factor compells manufacturers to produce their own parts at high cost. One manufacturer reported that he obtains only 10% of parts from the market as compared to 40% in the case of his foreign collaborator. The solution is partly liberalisation on the part of Government in import policy, partly initiative on the part of the industry in developing a supplier network through financial and technical aid as has been done by HMT and others.

e) A similar problem exists with regard to the quality of supplies available locally of raw materials - pig iron, coke and sand. The rejection rate in machine tool foundries in India is as high as 10% to 35%. The solution is closer liaison between the machine tool manufacturers and the suppliers of these raw materials and all the measures necessary on the part of the former - financial, technical, etc. - to ensure quality standards.

f) Machine tools exports are not packed and protected properly because of lack of knowledge of seaworthy packing on the part of exporters and non-availability of proper materials like suitable coniferous woods and rust preventers. The cost of certain packing materials is above the international level, for example, galvanised iron sheets and polythene sheets. It is necessary for both the industry and Government institutions to undertake research on design of seaworthy packing and arrange for technical assistance to new exporters. Steps should also be taken to make the necessary packing and protection materials available to exporters. If necessary, imports should be allowed for this purpose.

g) Although the railways give a freight concession on exports, machine tool exporters do not generally use rail freight because of long delivery time and uncertainty in getting wagon allotments, stipulations in regard to minimum load for wagons, difficulties in arranging cranes for loading and unloading, transhipment from one gauge to another and a variety of other procedural and operational delays. Because of these difficulties, machine tool exporters prefer to use road transport, often at two or three times the cost of rail transport. The only solution is for the Railways to examine this problem and extend improved service to exporters.

h) High freight rates from India and long shipping times to export markets: Every attempt should be made to obtain concessional freight rates from international shipping lines. In addition, the industry needs to establish warehouses and assembly plants abroad, if the volume of sales at present or potentially justifies this investment.

i) The Comecon markets are a fertile field for exports. However, as the sole contact is with the centralised state agency, the industry does not have adequate feedback from end-users for market development through design adaptations, after sales service and promotion. The negotiation of access to end-users for the industry will facilitate development of sales.

j) The Kennedy round will reduce the already low tariffs on machine tools. However, some potential export markets like Australia, the UK and many developing countries have high tariffs or import restrictions. These perhaps could be liberalised by diplomatic negotiations.

k) The industry does not have the back-up of a consular commercial organisation abroad to supply market intelligence of the type provided by Japan, U.K., West Germany, U.S. and other exporting countries. The Government could consider more extensive services of this nature to aid the export effort.

l) The policy on collaborations needs a review. It has advantages but the drawbacks need to be considered as well. First, it is a line of least technical resistance which hinders the growth of domestic applied design capacity. Secondly, the costs of collaboration are probably higher than the foreign exchange incidence of technical fees and royalties. Often, sale of components at high prices by the collaborator is a condition of the agreement. Thirdly, there are restrictions on exports. Fourthly, the designs are often not uptodate.

This situation in part may be due to the 5 year limit on collaborators, the restrictions on renewal and the low royalty, which in practice is 2½% of the value of output. This forces the collaborator to take a very short term interest in the project.

The liberalisation of collaboration agreements on lines which will make the collaborator take a long term interest in the project may be desirable.

Simultaneously, steps must be taken to avoid what Professor Blackett calls the "unnecessary waste of rediscovery, reinvention and re-development". The country should take advantage of the advances in technology abroad through licensing arrangements and not grudge the royalty liability in foreign exchange for imported know-how. This is dramatically illustrated by Japan, whose bill for imported know-how rose eight-fold from $ 20 million in 1955 to $ 160 million in 1964. In comparison, India's annual expenditure on royalties was of the order of $ 7 million in 1966.

The Fifth Plan and Beyond

48. It is imperative to initiate action on Research and Development to prepare for the future as the nature of the market will inevitably change in an industry like machine tools, which is characterised by rapid technological innovation. There are excellent prospects now for developing an export market in the advanced industrial economies for conventional general purpose machine tools during the Fourth Plan period. Further, if the efforts are successful, the Indian machine tool industry will have a solid marketing base in these export markets for future expansion in terms of a distribution network, customer contacts and, hopefully, an image for manufacturing high quality products. However, on present trends, future growth is entirely in the direction of sophisticated machine tools. Conventional machines account for 99% of the volume and 85% of the value of the machine tool market in the U.S. at present while sophisticated machine tools contribute only 1% of the volume but 15% of the value. By 1975, sophisticated machine tools are expected to comprise 75% of this market in value. The Indian machine tool industry must prepare for this change in the nature of the market in spite of current difficulties and disadvantages for developing sophisticated types of machine tools, if it is to sustain export sales during the Fifty Plan and beyond. The CMTI could be of major help to the industry in the area of long range product development.

SUMMARY AND RECOMMENDATIONS

1. Introduction

The recession and the urgent need to supplement a declining domestic market has stimulated the interest of the Indian machine tool industry in export. Because of the need to increase foreign exchange earnings and apparent limitations on traditional exports, the Government has given additional encouragement in the form of export subsidies.

The industry was indifferent to export until recently because of the seller's market in India. This situation has changed in the past three years, and the industry is working at half its capacity. Idle capacity has motivated the search for foreign markets, and both Government and industry have initiated action to promote exports.

1.1 Long-term Motives for Export

However, developing an export marketing strategy primarily as a palliative for the recession would be short-sighted since it would not provide the base for long-run growth of exports. The brutal fact must be faced that international markets are fiercely competitive. India will have to contend with experienced exporting countries like Japan which not only have superior technological skills but are able and willing to invest in marketing activities on a colossal scale. An attempt to build exports without sufficient knowledge of competitive conditions and adequate investment in product development and marketing facilities is unlikely to succeed against entrenched competition.

Success will depend on an intelligent and long-term export strategy supported by the entrepreneurial willingness to risk investments on the scale necessary to achieve results.

The Indian machine tool industry should be motivated to develop exports not simply as a response to the recession but because international markets present an opportunity for sales with attractive long-term growth prospects. International trade in machine tools has doubled in the last decade to reach a volume of $ 1600 million in 1967. Machine tool users world-wide import a quarter of their requirements from foreign sources, and India could be a potential supplier.

The export potential is best illustrated by the phenomenally successful penetration of the United States, the largest as well as the most competitive market in the world, by West Germany, U.K., Japan and Italy. Imports of machine tools by the U.S. rose by 390% between 1964 and 1967. Established exporters like West Germany and the U.K. increased their sales in the U.S. by over 300% and newcomers like Japan and Italy by 1000%. India could have a share if it makes the necessary efforts in technology and marketing.

Further, because of its important role in economic development and defence, it is essential for the machine tool industry to have a growing and profitable export trade. The machine tool industry is central to the efficiency and economics of the entire industrial sector. As domestic demand for machine tools will inevitably fluctuate, it is necessary to develop an export trade to sustain the industry. This fact now seems widely appreciated in the industry.

Finally, competing in export markets will compel the industry to keep pace with technological developments in design and ensure that it operates to international levels of quality and efficiency. In fact, the Indian machine tool industry is already beginning to experience these benefits.

1.2 The Present Study

The object of the present study is to assist Government and industry in the development of an export marketing strategy for Indian machine tools. The project was sponsored by the United States Agency for International Development and undertaken by the Indian Institute of Management, Calcutta and M.N. Dastur & Company, Private Limited, Consulting Engineers, Calcutta.

The expressly stated objective of the study was to:

> "I .... investigate the problems of production and export marketing of machine tools, and to identify the factors which are acting as impediments to increase exports.
>
> II ...., recommend measures for removal of the present impediments and also put into focus long-term planning of production for export markets".(1)

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(1) Contract for Survey of Export Trade in Machine Tools, Appendix A, pp. 1

In particular, the study covered the following aspects:

1. The world-wide supply and demand situation for machine tools with particular reference to India's position in the total world trade picture.

2. An evaluation of the technological and marketing capability of the Indian machine tool industry in light of the requirements for export.

3. An assessment of the potential market for Indian machine tools in different foreign countries.

4. A study of the export marketing techniques of successful exporters like Japan and Italy and their lessons for the Indian machine tool industry.

5. Recommendations on export strategies for the Indian machine tool industry and Government.

The study was based on an extensive field survey covering fifteen foreign countries and the Indian machine tool industry. Discussions were held by the survey teams with manufacturers, distributors, end-users and officials of Government and trade associations. Special attention was given to in-depth surveys of the U.S.A., Canada, West Germany, Italy and Japan because of their export potential as well as their marketing techniques.

This paper indicates the potential of different markets for machine tools and describes how Japanese and other successful foreign manufacturers have won a substantial share of the world's largest market, the United States. It presents an evaluation of the Indian machine tool industry and its export potential. And it recommends guidelines for India's export strategy and related issues.

2. The World Market

On a world-wide basis, users are now importing $ 1600 million of machine tools or a quarter of their $ 6000 million annual requirement. World trade in machine tools has doubled in the past decade. Because of continuing increase in demand, rising machine tool production costs in advanced countries, and further reduction of relatively low trade barriers by the Kennedy Round, the potential for exports is increasing.

The geographical distribution of the international market and trade in machine tools is analysed in Appendices 1 and 2.*

The advanced market economies - North America, Western Europe, Japan and Australia - account for 69% of the world market for machine tools and 61% of imports. The U.S. is not only the largest single market with a 31% share but is also the biggest importer, absorbing 11% of world imports.

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* Supplementary data on exports of machine tools from 14 major supplier countries to all the countries in the world for 1964-66 is presented in Appendix 2A.

The centrally planned economies account for 24% of the world market and 20% of world imports. The U.S.S.R. has the lion's share with 16% of the world market and 8% of world imports.

The eighteen countries covered above account for over 90% of the world market and 80% of imports. The balance of less than 10% of the world market and 20% of imports is fragmented among the remaining 100 odd countries of the world, including the developing countries. The size of the markets in the individual developing countries is illustrated by the data for representative economies in this sector presented in Appendix 2.

Distribution of Exports by Product Type

A preliminary analysis of the distribution of international trade by product type and unit price presents the following picture.

The U.S., by and large, is exporting extremely sophisticated machine tools e.g., automobile transfer lines, N/C machines etc. It is importing sophisticated equipment from Switzerland at the top end of the scale and standard general purpose machines from Japan and Italy in the lower priced range. The average value per ton of exports is $ 4,700 as against an estimated value of $ 2,500 per ton of imports.

Switzerland exports even more sophisticated equipment than the U.S.A. and imports standard machines. The average price per ton of exports in 1965 was twice that of imports - $ 5,800 per ton of exports compared to $ 2,500 per ton for imports.

The advanced Western European countries both export and import a wide range of machine tools spanning the spectrum from sophisticated to standard equipment. This is seen from the relative parity between the average value per ton of exports as compared to imports, illustrated below for a few countries.

	Average value per ton	
	Exports	Imports
West Germany	$ 3,000	$ 2,700
France	$ 3,000	$ 3,700
U.K.	$ 2,800	$ 3,700

However, the trends in domestic production and exports of the Western European economy are in favour of sophisticated equipment, and imports of standard general purpose machines are increasing.

Japan has a very interesting and significant pattern. By and large, it imports only sophisticated equipment. This is indicated by the fact that 55% of Japanese imports are from the U.S.A. and Switzerland. On their part, they export expensive equipment to the U.S.S.R. and Red China at an average value of $ 10,000 per machine and smaller low-priced standard machines to the U.S.A. at an average value of $ 3,000 per machine.

The developing countries need low-priced, standard general purpose machines, and this is reflected in the pattern of their imports.

Export Orientation

In many countries, the machine tool industry is strongly oriented towards export markets and has been quick to take advantage of the opportunity to expand exports. The ratios of export to production for selected countries are given in Appendix 3.

This table reveals that while the average machine tool producer in the world exports a quarter of its output, the machine tool industry in a number of countries exports half or more of its production. This is true not only for small countries like Denmark, Switzerland and Belgium, which export over 70 per cent of their production, but also for West Germany, the world's third largest machine tool producer, and other large Western European countries like France and Italy, which export between 40 and 50 per cent.

Moreover, while world trade in machine tools increased by about 20 per cent between 1964 and 1967, some export minded countries increased their exports much more rapidly. Japan and Italy succeeded in tripling their machine tool export earnings in this period.

3. The U.S. Market - A Case Study in Export Promotion

The successful development of machine tool exports by several countries to the $ 1,850 million U.S. market has many lessons for India.

The accompanying charts illustrate the growth of machine tools exports to the U.S. since 1964 and the spectacular increases achieved by a number of countries, particularly Japan (121%) and Italy (962%). West Germany and the U.K. have also done very well with increases of 302% and 439% respectively.

CHART 1

U.S. IMPORT OF MACHINE TOOLS, 1964-67

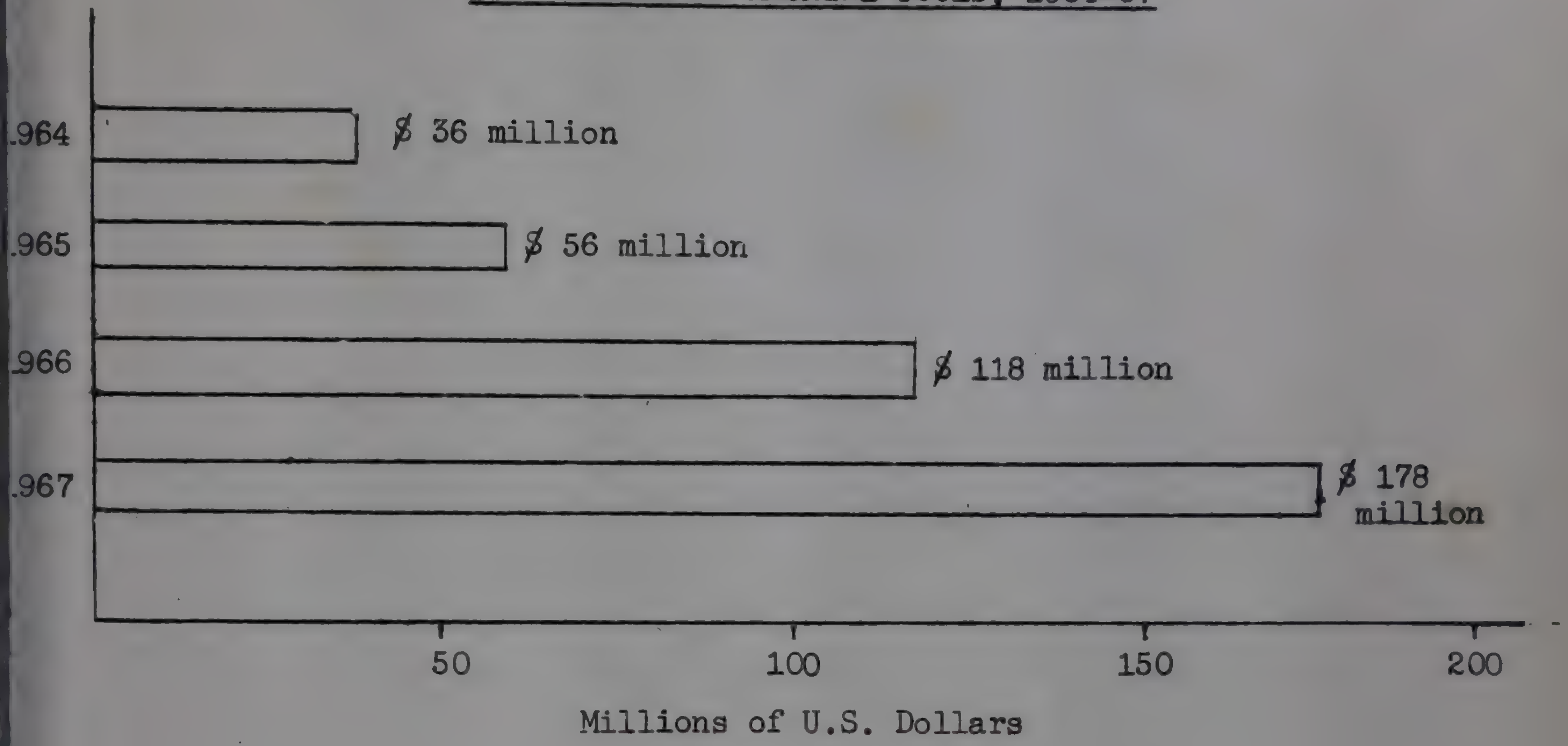


CHART 2

PERCENTAGE INCREASE IN MACHINE TOOL EXPORTS TO THE U.S. BETWEEN 1964 and 1967

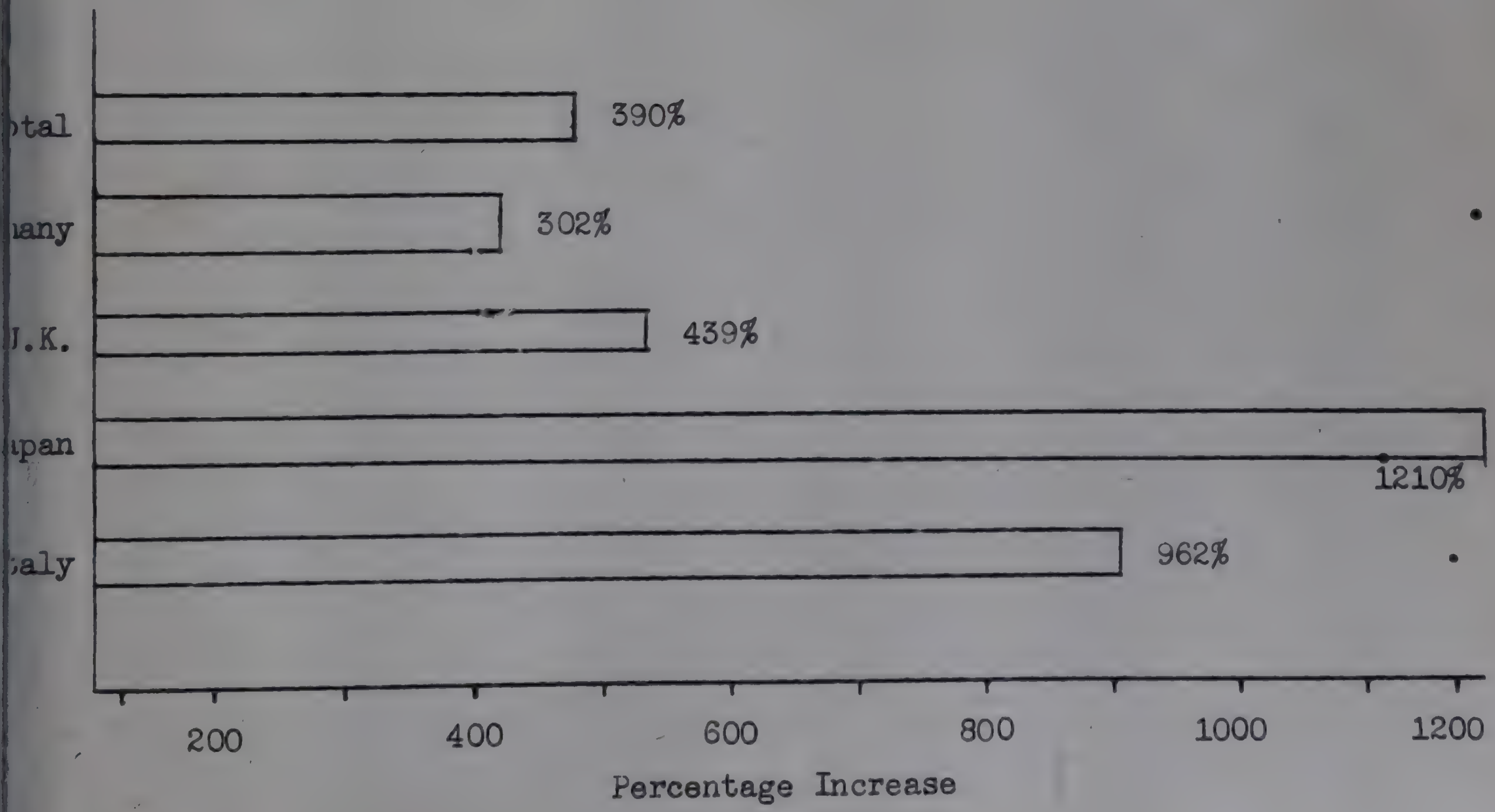
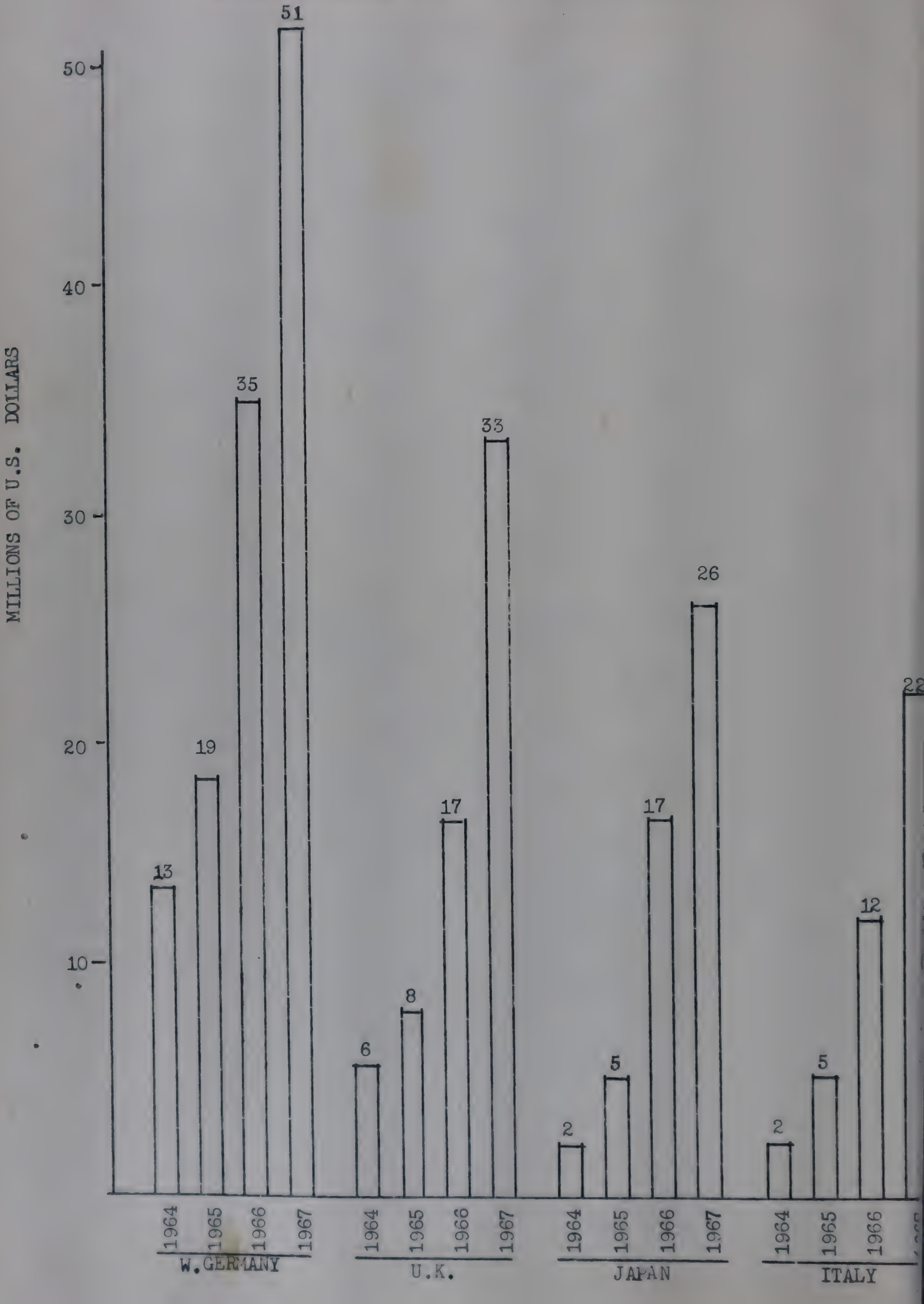


CHART 3

EXPORTS OF MACHINE TOOLS TO THE U.S., 1964-67



The opportunity for the breakthrough for exporters was provided by the Vietnam war, which enormously increased the demand for machine tools. The U.S. market rose from $ 1,050 million in 1964 to nearly $ 1,850 million in 1967, an 80% increase.

The U.S. machine tool industry, working on a three shift basis, could not cope with the demand. Delivery times lengthened to an average of 10 months.

This provided the opportunity for foreign manufacturers, who could deliver machines much faster than the hard pressed U.S. industry. In the case of smaller, standard machine tools, foreign suppliers could give immediate delivery from ready stocks in the U.S.

Advance Planning

The crucial lesson for India is that the exporters were poised and prepared to take advantage of the opportunity when it came.

Japan, for example, exported only $ 0.34 million of machine tools to the U.S. in 1961. Exports edged up to $ 2 million in 1964. Then in three years they spiralled to $ 26 million in 1967, and they are still rising. Such rapid exploitation of the favourable market situation created by the Vietnam war was feasible only because of preparatory work in product development undertaken several years in advance and investment in the necessary marketing facilities in the U.S.before the opportunity arose. This is applicable to Italy as well, and, of course, to West Germany and the U.K., which had been exporting to the U.S. for many years.

This preparatory planning was materially assisted by market surveys and field research undertaken and financed by state agencies like Japan External Trade Organisation (JETRO) and the Federal Office for Foreign Trade Information (BfA) of West Germany.

The marketing strategies of the successful exporters varied according to their individual competitive advantages and the degree of risk they were prepared to assume. However, there were certain generic factors applicable to all.

Product Development

A major factor was the preparatory work in product development by exporters who deliberately designed machine tools to suit the U.S. market. By 1964, their machines were comparable in efficiency and performance to the U.S. machines against which they were competing. Many U.S. importers interviewed during our survey contrasted their present satisfaction with imported machine tools with their earlier findings that they were too light and too slow to suit U.S. production requirements. Some recalled their dissatisfaction with European and Japanese machine tools when the emergency of the Korean war compelled resort to imports and noted how remarkably the situation has changed in the subsequent decade. American observers commented on the rapid advance in European machine tools compared to as recently as five years ago.

The important consideration is that for Japan, Italy and other countries to supply machine tools fully acceptable to American users by 1965, when the opportunity came, end-user research, product development, and retooling of plant had to be undertaken several years in advance. The lead time for designing, testing, and initiating commercial production of a new conventional, general purpose machine tool is 3 to 5 years and sometimes longer. Even limited redesigning of an existing model for the U.S. market requires about 18 months.

Foreign exporters also take full advantage of foreign technical collaboration in product development. Further, they utilise the latest advances in technology through licencing arrangements and do not grudge the royalty liability in foreign exchange for imported know-how. This is dramatically illustrated by Japan, whose bill for imported know-how rose eight-fold from $ 20 million in 1955 to $ 160 million in 1964. In comparison, India's annual expenditure on royelties was of the order of $ 7 million in 1966.

It must be borne in mind that while these exporters make numerically controlled machine tools, their greatest success in the U.S. market is in conventional general purpose models, like small and medium engine lathes, light to medium-heavy duty milling and boring machines, and grinding machines. In these product groups, imports account for 25% of the U.S. market. India has the technical capability of producing such machines, but it must be willing to adapt its designs to suit U.S. requirements.

The satisfaction of U.S. users with the performance and after-sales service of imported machine tools is such that American machine tool manufacturers will find it difficult to dislodge them even when the current sellers' market lifts, particularly because of the price advantage the foreign machines enjoy.

Price Advantage

The second generic factor favouring exporters is that, even after bearing freight and customs, they have a substantial price advantage over their U.S. competitors. The price differential varies from 5% to 10% in the case of West Germany, to 25% and sometimes more in the case of Japan or Italy.

The major reason is lower labour costs. Machine tools are a relatively labour intensive industry and in the U.S. labour sometimes accounts for as much as 50% of the costs of production.(1) This is accentuated by the willingness of exporters to accept a lower margin of profit on export sales and charge lower prices. In addition, exporters enjoy tax rebates and other subsidies from their Governments.

India could enjoy the price advantage accruing from lower labour costs if productivity is put on par with foreign competitors through improved training and better management.

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(1) As stated by the National Machine Tool Builders' Association in the U.S. in "Hearings on the Future of U.S. Foreign Trade Policy", June 6, 1968, p. 15

Marketing Organisation

The third generic factor favouring the exporters who successfully exploited the opportunity which arose in the U.S. market in 1965-67 was that they were organised to deliver machine tools faster than their American competitors, supported with comparable facilities in terms of pre-sale and after-sale service and adequate inventories of spare parts. The Japanese and other foreign exporters stress "immediate delivery" as a selling point in their advertising.

This again required organising of logistics in advance, including locating warehouses, building inventories of machines and spares, putting technical personnel in place for servicing and creating a distributor network.

The standard practice of the major Japanese exporters like Marubeni-Iida, Ataka America, and Kanematsu-Gosho, is to have an apex marketing organisation, manned by their own sales and technical personnel, very few in number but consisting of high calibre specialists. This staff undertakes marketing research and development of a marketing strategy, advertising and promotion, and sales through the dealer network. The apex organisation also operates central warehouses. The costs of such apex marketing organisations average $ 200,000 to $ 400,000 per annum.

Many German exporters delegate the marketing function to an American agent, who receives a commission of 10% on total sales, to plan and supervise their operation in the U.S. market. However, the Germans have been operating in the U.S. market for decades and their agents are so closely associated with them that they are practically subsidiaries functioning like the apex marketing organisations of the Japanese.

Experienced Local Distributors

The apex marketing organisation is underpinned by a network of regional distributors who undertake the selling, delivery, and servicing. The U.S. is such a large market that there are virtually no national distributors and, therefore, there is no alternative to appointing a number of regional distributors.

These distributors normally represent several manufacturers of machine tools, both domestic and foreign. Regional distributors naturally vary in experience in selling machine tools, customer contacts, technical and financial resources, and warehousing and servicing facilities. There is keen competition among foreign suppliers to secure the services of the best distributors. The Japanese place a premium on getting first-class distributors and do not give their agencies to dealers without experience in the machine tool trade. Currently, they are taking advantage of their increased sales in the U.S. to attract the bigger and more experienced distributors to represent them.

Foreign suppliers pay a higher commission of 20% to distributors as compared to the 10% given by U.S. manufacturers as an incentive to take on their lines and promote their sales.

Within these general conditions applicable to all foreign exporters to the U.S., individual countries have followed distinct strategies.

West Germany

The West German marketing strategy is unique in that neither lower prices nor aggressive promotion have been the prime factors. Their price advantage compared to U.S. competitors is a marginal 5% to 10%. Their utilisation of advertising, exhibitions and other promotional methods has been limited. They have relied primarily on their technical capability and reputation for manufacturing high quality machine tools. Some of their machine tools have a wider variety of accessories and adjustments built into them than their U.S. counterparts.

This strategy is, to say the least, premature for the Indian machine tool industry.

Japan

The Japanese strategy is characterised by painstaking planning at home and aggressive marketing in the U.S.

Their export drive in the U.S. began as late as 1961, when their sales were only $ 0.3 million. They began by setting up displays at the three major exhibitions held by the machine tool industry in the U.S. to display and demonstrate their products. The product development of some companies to manufacture machine tools suitable for U.S.

needs was complete by that time, implying that the effort began even earlier.

One the solid base of a product range which could compete on performance in the U.S. market, the elements on which their strategy was based were as follows:

a) Selectivity in the product range on which they concentrated their marketing effort. They assessed their greatest competitive advantage to be in the field of standard, general purpose machine tools. They focused their promotion on these lines and did not dissipate their efforts over the entire range of machine tools.

b) Competing on price by under-selling their U.S. counterparts by 25% to 40% or more.

This is a standard Japanese tactic when entering a new market. It is followed by progressive price increases as they consolidate their position in the market. They had the same policy in Australia, where they entered in 1961 and made rapid progress. Prices have since been raised by 40%.

c) The organisation of an apex marketing cell to plan and execute sales strategy. An organisation staffed with the required number of qualified personnel costs $ 200,000 to $ 400,000 a year. The Japanese were able to economise because they operate through mammoth trading houses like Mitsui and Marubeni-Iida selling a diversified range of products over which overheads can be spread.

d) The organisation of an effective distribution machinery through a network of regional distributors selected on the basis of their experience of the machine tool trade. The Japanese did not compromise on experience even though it was difficult to persuade established dealers to take up new and unknown lines. They gave their distributors the incentive of a 200% commission as compared to the 10% they could earn from U.S. manufacturers.

e) The distributors were backed up by adequate investment in inventories of machines and spares to ensure prompt delivery and service.

d) Forceful promotion of Japanese products and of their reputation for high quality machine tools by advertising on a scale matching and surpassing their American competitors. They participated in trade fairs and made full use of the major trade journals, supplemented with direct mail efforts.

It is difficult to estimate their expenditure on advertising but some idea can be gathered from the advertising budget of a major American company with a turn over of $ 65 million per annum, which spends $ 180,000 on publicity. The Japanese are estimated to be spending $ 200,000 per annum on printed advertising on current sales of $ 26 million.

In addition, they participate in all the trade exhibitions, especially in the annual ASTME and WESTEC fairs. At the 1968 ASTME show the Japanese Machine Tool Trade Association rented 10,500 square feet at a cost of $ 63,000 plus the expenses of personnel, travel, and transportation. A number of Japanese machines were also displayed separately in stalls taken by their distributors. The Japanese are estimated to be spending over $ 200,000 per annum to rent exhibition space alone in North American shows. Japanese stalls were outstanding in having continual demonstration of all the machines on display. As there were 64 machines on display in the trade association stall alone, each requiring at least one operator, an idea of the personnel involved can be gained.

Incidentally, the Japanese are now demonstrating some of their numerically controlled machine tools instead of limiting themselves to the conventional machines which account for the bulk of their sales. This is calculated to build their image and pave the way to upgrading their market.

The Japanese supplement their promotional efforts at exhibitions with individual demonstrations for customers. Sometimes they even supply machines on consignment to new customers for a six month trial period to create a market.

Advertising and Promotion - A Capital Investment

The Japanese regard their expenditure on advertising and promotion as a long-term capital investment, similar to physical plant, which produces a return in the future. Their heaviest investment in such activity is when they launch their export drive in a market, and expenditures bear no relationship to current sales. They treat them as a capital investment for developing a market and amortise their expenditures on a long term basis.

This blitzkrieg strategy has obviously produced results in a relatively short period of time. However, essential prerequisites are careful advance planning, the technical capability for the necessary product development, and entrepreneurial willingness to risk the sums involved in market development.

The Japanese are as selective in the export markets they attack as in the product range that they promote. They are concentrating their efforts in markets where their competitive advantage is greatest - the U.S., U.S.S.R., Red China and Asia. In the U.S., they sell standard machines. They market sophisticated machines to the Communist block. They have almost ignored Western Europe, where their competitive advantage is least, and many of the developing countries. The ECM accounts for only 2% of their exports.

Italy

The Italian strategy is to concentrate on manufacturing low-priced standard machine tools to order on behalf of U.S. distributors, who market them under their own brand names and undertake full responsibility for the planning and financing of marketing activities in the U.S. For example, S & S Machinery is the U.S. importer for several Italian firms, including Alpa, C.M.T., San Rocco and Mannaioni. These machines are sold under names like "Lansing", "Toledo", "Cleveland", "Supermill", and "Speedmaster".

On their part, the Italian manufacturers have to be technically responsive to the design requirements of the U.S. market as specified by their American sponsors. Subject to this condition, they save themselves from the expense, delay, and bother of setting up a marketing organisation in the United States.

This strategy was successful under the boom conditions produced by the Vietnam war, but it has serious drawbacks as a long-term strategy.

No good-will is being developed for Italian machine tools marketed under brand names owned by American distributors. The latter may drop Italy as a source of supply if they find cheaper alternatives, leaving the Italian manufacturers without a marketing organization or market.

As many units of the Italian industry do not have a marketing organisation of their own in the U.S., they do not have direct customer contacts or their own organization to secure information on customers and competitors necessary for product development nor the machinery for an independent selling operation.

As a strategy, the Italian example may be the easiest and most appropriate to follow in the initial years for some Indian manufacturers who have not yet entered the U.S. market. However, the long-term dangers must be taken fully into consideration.

Czechoslovakia

Czechoslovakia is a major international supplier of machine tools with exports of $ 110 million per year, the third largest exporter in the world. The Czechs have increased their exports of machine tools over-all by 55% since 1960 and by 260% in Western markets. They account for 6% of U.S. imports.

The Czech strategy is similar to that of West Germany in that it is primarily based on superior technology, nurtured by their great R & D establishments - the Research Institutes of Machine Tools and Metalcutting Technology (VUOSO), Metalforming Machines and Metalforming Technology (VUTS), and Mechanisation and Automation (VUMA). The product range is continually being upgraded in the direction of sophisticated, numerically controlled machine tools.

The Czechs back up their technological advantage with a strong field organisation and substantial advertising and promotional activities. Their international advertising budget was $ 5.6 million in 1967, or 5% of export sales turnover. In addition, they participate extensively in machine tool trade exhibitions, particularly in Europe.

They also have a good field organisation. Machine tool exports are channelled through a single agency, Strojimport, which maintains close liaison with the home manufacturing and research establishments and directs the field organisation.

The selling organisation consists of a small marketing cell at the apex and 81 field offices in the world.

Every field office is underpinned by a national distributor on whom very heavy reliance is placed. Consequently, great care is taken in their selection on the basis of very strict commercial and technical criteria. Like the Japanese, the Czechs place a premium on experience. Further, the distributors are expected to conform to the specifications laid down by Strojimport in the structure, method of operation and information system of their selling organisation. For example, each distributor has to have a minimum technical complement of 2 mechanical engineers and 1 electrical engineer in addition to skilled workers at various levels. All are sent periodically to Czechoslovakia for training. This is supplemented by annual field visits to customers by technical personnel from the home manufacturing and research establishments.

The marketing cell at the field office directs the distributors' activities as well as promotion, marketing research, training of personnel and the field visits of technicians from the parent organisation.

The U.S. Market - An Imperative

The marketing strategies followed by exporters to the U.S. have been stressed in this paper because of the importance of that market.

The U.S. market is so large and diverse that it offers scope for a large volume of exports at many levels of sophistication. Even a small share of the market would be worthwhile for India. The 1967 imports of $ 178 million represented only a 9.5% share of the total U.S. market. The Japanese share with exports of $ 26 million is a mere 1.4% of the U.S. market. Nevertheless, it represents 45% of Japan's world exports of machine tools.

The share of the U.S. market supplied by other exporters is also relatively small - West Germany - 2.7%; U.K. - 1.8%; Italy - 1.2% but represents a significant proportion of their total exports.

Further, the size of the American market offers scope for a diversified product range which can be taken advantage of by India as has been done by others.

In the words of the Managing Director of one Indian machine tool company, "after seeing the American market I have come to the conclusion that all our efforts should be concentrated on popularising our machine tools in U.S.A., which will absorb more (of our machines) than the rest of the world put together. It is the latter (U.S.) market which will really sustain us in the export drive."

The efficient infra-structure of a distributor network and advertising and promotional media that exists in the U.S. makes market penetration easier and more economical than elsewhere, provided, and this is all important, the product range is acceptable to the U.S. consumer.

Further, credit is not essential in the U.S. market as it is elsewhere because users have the financial resources to pay cash or raise credit on their own. It is standard practice to pay cash within 30-40 days of delivery.

Finally, the technological and competitive tempo of the U.S. market acts as a valuable stimulus to exporters to continually improve their technical and marketing efficiency. Even the Czechs feel that it is essential to operate in the U.S. market "because competitive conditions actively stimulate product development and better marketing techniques," as an official of Strojimport in Prague told our field survey team.

For all these reasons, the Indian machine tool industry should be active in the U.S. market.

4. Target Markets

The first step in evolving an export strategy for India is to isolate the target markets which offer the best prospects. The distribution of the world machine tool market and imports suggests that the best potential lies in the advanced economies, both in the Western and in the centrally planned areas. These comprise primarily the eighteen countries listed in Appendix 1, which account for over 90 per cent of the world market and 80 per cent of imports.

There must be further selection of markets with the best potential within this group for concentrated marketing efforts. The importance of the U.S. market has already been emphasised. The analysis suggests that the six countries listed below should be the prime targets for India's export efforts:

First Priority Export Markets

Country		Total Market Millions of US $ in 1967	Share of World Market %	Imports Millions of US $ in 1967	Share of World Import %
U.S.A.	..	1,852	30.9	178	11.1
Canada	..	134	2.2	104	6.5
U.K.	..	465	7.7	154	9.6
West Germany	..	438	7.3	58	3.6
France	..	315	5.3	117	7.3
Australia	..	61	1.0	37	2.3
Total	..	3,265	54.4	648	40.4

India's export target of Rs 7.5 crores, or $ 10 million, for 1973-74 represents only a 0.3 per cent share of the total market of these six countries in 1967 and a modest 1.5 per cent share of their 1967 imports.

The size and diversity of these markets provide ample scope for selective segmentation of the market and winning a share in certain segments for Indian exporters through appropriate product development and marketing strategies. This is the strategy followed by Volkswagen, which isolated a consumer group in the U.S. automobile market which wanted a more economical, smaller car than those produced by American manufacturers. They concentrated their marketing efforts on this target group. It represented only a one per cent share of the U.S. automobile market but nevertheless sold upwards of 100,000 cars per annum and earned considerable foreign exchange for West Germany.

It is necessary to isolate the particular market segments in these six countries for which India has the technical and competitive capability to develop and produce machine tools with the required specifications. Technological trends as well as the movement of costs, particularly labour costs, in the U.S., U.K., and West Germany are shifting domestic research, development, and production toward more sophisticated machine tools. Many companies are planning to drop production of their conventional machine tools because they are unable to compete on price with imports. Thus, "U.S. builders are cutting back on efforts to develop new conventional models and are concentrating heavily on the production of N/C machine tools. A relatively small industry, U.S. machine tool builders - except the very largest - can't develop new technology for conventional machines as well as exploit the potential of N/C". (Iron Age, May 1968). In Canada and Australia, machine tool requirements are met chiefly by imports. As a result, these six countries would be large markets for the conventional, general purpose machine tools that India could supply more economically, provided the required consumer research, product development, and marketing are undertaken.

Second Priority Markets

The following table presents a list of the second priority markets.

Country	Total Market: Value in Millions of US $	Total Market: Share of World Market %	Imports: Value in Millions of US $	Imports: Share of World Imports %	Pattern of Exports and Imports: % of production exported	Pattern of Exports and Imports: % of consumption imported
1) West Europe						
Benelux	48	0.8	37	2.3	75	73
Switzerland	64	1.1	30	1.9	79	50
Sweden	44	0.7	34	2.1	74	76
Denmark	17	0.3	15	1.0	89	87
2) Comecon Countries						
U.S.S.R.	934	15.6	120	7.5	7	13
Czechoslovakia	141	2.3	45	2.8	59	32
Poland	80	1.3	42	2.6	40	23
E.Germany	119	2.0	25	1.6	50	21
Total:	1,447	24.1	348	21.8		

The above countries represent 24 per cent of the world market and 22 per cent of world imports. They have many of the characteristics of the first priority markets which make them a favourable field for Indian exporters.

Each of the above markets is large enough to justify the marketing effort. The free market economies also have a readily available marketing infrastructure and the mechanics of the marketing operation will be similar to those proposed for the priority markets.

Third Priority Markets

The developing economies will increasingly need machine tools for their economic growth. However, the marketing effort has to be scaled to their export potential in comparison to the first and second priority markets. All the developing economies put together account for less than 10 per cent of the world market for machine tools and 20 per cent of world imports, and this is fragmented among 100 odd countries. This increases the marketing cost in relation to potential and is accentuated by the difficulties arising because most of these countries do not have the necessary marketing infrastructure. The difficulties of undertaking marketing research and creating distributor organizations would be great. Further, the advertising and promotional facilities for market stimulation are not adequate for economic and speedy sales development. Finally, the requirement for credit is very heavy in such markets.

Virtually all of the Indian machine tool companies in the organized sector which have tried to develop a market in developing countries (apart from Ceylon) have been disappointed by the results and have concluded that the returns would have been larger if they had invested the same effort in the developed countries.

In these circumstances, the developing countries are unlikely to yield as high return on investment in marketing activities as the first and second priority markets. These countries do not, therefore, justify investment in a sustained marketing operation for India.

Unpromising Markets

Countries like Brazil, Mexico, Argentina, Spain, Yugoslavia, and even Japan and Italy are unpromising markets. In fact, they are likely to be India's major competitors in export markets. The domestic machine tool industry in these countries is at a stage of technological development which has considerable overlap with that of India. India will have no comparative advantage in contending with the domestic industry and, therefore, export efforts in these countries are not likely to pay off.

Focus of Recommendations on Priority Markets

We have stressed the importance of selecting a few markets and a restricted product group for the major export promotion efforts for Indian machine tools. It is inadvisable to launch an offensive on all fronts in terms of markets and product groups in India's export drive. The example of Japan proves the soundness of the principle of selectivity. Our finding is that the U.S., Canada, U.K., West Germany, France and Australia offer the largest potential markets for Indian machine tools and the highest return on export promotion expenditures. Our report therefore focuses on the strategy to be used in these markets.

In addition, the countries in South-East Asia and West Asia, including Egypt, which have launched programmes of industrialisation offer promising markets for general purpose machine tools, especially for small-scale manufacturers. Of course, the investment in marketing activity should be scaled to their potential.

This does not mean that there is no market for Indian machine tools in other countries. The same machines that could be sold in the six primary markets could be sold elsewhere. More important, some of the machinery produced in India which would not sell in the six primary markets or which cannot be sold in the advanced countries under the terms of collaboration, could be sold in other areas like the developing countries. However, on the basis of our study it is concluded that it would not be worthwhile to invest on a large scale to promote machine tool sales in these other countries, with the exception of the second priority markets once progress has been made in the first priority ones. The volume of sales that would be achieved in the third priority and unpromising markets would be unlikely to justify major expenditures on image building, and it is felt that Government subsidy of promotional activities should be concentrated where the returns are greatest. At present, it seems advisable for India to confine itself primarily to appointing agents and taking whatever business is available in these categories of markets.

Apart from this, manufacturers could participate in exhibitions in developing countries if they desired, and foreign exchange should be released liberally for such export promotions. Companies which already have exports of items like diesel engines and pumps to the developing countries, will find that machine tools can be promoted alongside on a limited scale without much extra expense or effort. Also, there are a few developing countries where a worthwhile volume of sales might be secured, such as Iran or Malaysia.

The Government can use its influence to increase sales to East Europe by securing permission for Indian manufacturers to establish direct contacts with end-users. Further, it can try to secure reductions in freight rates. It can also maintain the existing level of subsidies, improve its commercial services and remove the various obstacles to export arising out of Government policies as suggested later in this report.

The above exercise on determining target markets in order of priority only provide general guidelines for overall marketing strategy. There should be flexibility in their application to assist development by individual manufacturers of specific markets where they have reasons for convidence that their product range has a promising potential.

5. Target Product Groups for Export

An essential corollary to selectivity in target markets for concentration of export effort is selectivity in the products chosen for promotion in the target markets. An excellent example is Japan, which promotes high-priced, sophisticated equipment in the U.S.S.R. and Red China and low-prices, simpler machines in the U.S.

The major target product groups for Indian machine tool exports are light to medium-heavy conventional, general purpose machine tools.

These machines are manually controlled and fed, in contrast to either numerically controlled or automated machine tools. In terms of the final sales price, they would generally range from $ 2,000 to $ 8,000, in comparison to numerically controlled machines with an average price of $ 85,000 and heavy duty machines and automated transfer lines often costing upwards of $ 100,000. They are versatile in application and not designed for a specialized metal working purpose nor built to order for a specific customer. These are the same tools in which both the Japanese and Italians initially concentrated their efforts and achieved their greatest success.

Their major market is primarily in small lot operations, such as subcontracting shops, repair and maintenance, and vocational training institutions. Some are appropriate to small and medium batch production applications. A very few, like single-spindle automatics, are suitable for high volume production.

More specifically, among the types of machines now produced in India there is a good market for centre lathes with swing over bed of 11" to 21" and 30" to 60" between centres; competing with models selling in the U.S. for $ 2,500 - $ 7,000. Similarly, India would be able to compete in knee-type milling machines, sizes 0 to 3, competing with models selling in the U.S. for $ 2,000 - $ 9,000. There would also be a market for the following tools of the dimensions now produced in India: radial drills, column drilling machines, capstan and turret lathes, surface grinders, and tool and cutter grinders. (1)

There is also a good market for higher productivity machines like the HMT electrically controlled milling machines. However, their prices are not competitive in export markets at present because of the low volume of production. The development of export markets will have to wait till domestic demand has grown to a level realising adequate economies in scale in production. This is only a question of time.

In this context, it would be emphasized that the leading members of the Indian machine tool industry have the technical knowledge as well as the production facilities for building machine tools to designs and standards acceptable to the U.S. and other sophisticated markets. This was repeatedly stressed by end-users and distributors interviewed by the Survey Team in the United States who had knowledge of the Indian machine tool industry. The gap was not technical skill but lack of knowledge of end-user requirements in terms of designs and the motivation to make the necessary design adaptations. Consumer research and orientation could remedy this deficiency and make Indian machine tools acceptable to foreign customers.

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(1) Appendix 3A presents data on prices of a representative sample of U.S. and foreign machines in the U.S.A. to the final customer as well as current prices of Indian machine tools in India.

6. Target Customers

The definition of the target customers for India's export strategy essentially follows from the target product groups.

In this section we analyze the machine tool users in the priority markets in order to identify the target customers for Indian products.

The largest market for machine tools is in direct production applications in the metalworking industries, such as automobiles, transportation equipment, electrical and other machinery, metal furniture and the like. In the U.S. and other advanced economies which comprise the priority markets, metalworking industries account for over 80% of the market.

The breakdown of the market by type of customer in the U.S. will illustrate the pattern:

			% of Market
(1)	Metalworking industries	..	82.7
(2)	Other industrial users, mainly maintenance shops	..	12.4
(3)	Colleges, vocational institution and high schools	..	2.6
(4)	Inventory with the trade	..	2.3
			100.0

Though the maintenance shops and educational customers account for a small share of the total market, nevertheless they offer attractive sales potential for the small, general purpose conventional models that the Indian machine tool industry is best equipped to export.

Within the largest customer group in the U.S., the metal-working industry, the distribution of the machine tool market is as follows:

			% of the Machine Tools held
(1)	Machinery except electrical	..	33.8
(2)	Fabricated metal parts	..	22.7
(3)	Transportation, including automobiles	..	16.0
(4)	Electrical machinery	..	11.7
(5)	Primary metals	..	6.1
(6)	Instruments, photo equipment, clocks	..	4.4
(7)	Miscellaneous	..	5.3
			100.0

The nature of the customer universe in the U.S., which is representative of the advanced economies with obvious differences in scale, and the marketing and distributive problems involved are illustrated by the following data on the metalworking industry by size of plant:

No. of employees	No. of plants	% of machine tools
Below 50	80,001	29
50 to 99	9,924	13
Over 100	14,954	58
	104,879	100

Further, while the customer universe is very large, the bulk of the metalworking plants (65.7% of metalworking employment) in the U.S. is concentrated in 11 contiguous states out of the 50, in the industrial belt stretching from the Great Lakes to the Northeast, with California contributing a further 10%. This concentration, common to metalworking industries everywhere which congregate around either raw material supplies or customers, simplifies the distribution problem in that a national network is not necessary.

This analysis indicates the profile of the target customer to be as follows:

(a) A large universe of users who are not engaged in large lot production:

  i) Small lot sub-contracting shops
  ii) Repair and maintenance shops of plants
  iii) Vocational training institutes.

(b) The bulk are concentrated in 11 states in the industrial belt in the North-eastern region of the U.S. and California. The latter is of particular significance since even a 10% share of the vast U.S. market makes the machine tool market in California comparable in size to the entire Canadian market. Moreover, some suppliers of foreign machine tools, notably the Japanese, and also Mysore Kirloskar, have had their best markets on the West Coast, especially around Los Angeles. This is where growth is more rapid, particularly of small sub-contracting shops catering to the aerospace industry.

(c) The customers are not concentrating on bulk production of standardised items. They do not require specialised or heavy duty machine tools but rather general purpose machine tools capable of versatility in small lot operations, which means a range of features to cater to variation in the job contracts they receive.

(d) Within metalworking, there would be a good market in smaller and owner-operated shops which have limited funds for investment. This is particularly true in the first priority markets outside the U.S.

Further, the field survey in the U.S. indicated that the bulk of target customers as defined above buy used and rebuilt U.S. machines or Japanese, Italian and other imported machines due to the cost factor. Commenting on the Japanese exhibition at the 1968 Westec Tool Show in the U.S., American Machinist observed, "five Japanese members showed a dozen machines at Westec - lathes, grinders, and millers aimed at the small-to-medium job shop, especially shops serving aerospace. The Japanese are zeroing in on the U.S. market for general purpose machine tools such as engine lathes, turret lathes, milling machines, and grinders." (March 15, 1968, p 99)

Moreover, Indian and other conventional machine tools will find increasing competition from numerically controlled machines, which are particularly suited to small lot production.

Therefore, Indian machine tools will have to be competitive in price as well as comparable in quality to enter the market.

Finally, the large customer universe necessitates reliance on a net-work of experienced regional distributors who can provide customer contacts and facilities for servicing and spare part supplies. Otherwise, a large field force would have to be employed and the cost would be prohibitive.

The customer universe will have the same characteristics in other advanced industrial economies, requiring similar arrangements with experienced distributors.

The customer universe in developing economies is likely to be confined to the repair and maintenance shops of existing industries and nascent metalworking industries. The sales potential will be small and the most viable arrangement would be a national distributor.

7. Restrictions on Product Range for Export

There are three serious limitations on the range of Indian machine tools presently suitable for export. First, a number of Indian machines like planers, shapers, and slotters are low productivity machines for which there is very little market potential in the advanced countries. Second, a large number of Indian machines are produced under collaboration agreements which restrict their export. And, third, many Indian machines would require design modifications before they would be suitable for the advanced countries.

Each of these points is discussed in detail below, and the implications for India's export strategy are pointed out.

7.1 Low Productivity Machines

Because of high wages and the resulting demand for high output per worker in the U.S., the market for low productivity machines like planers, shapers and slotters, which are being replaced by milling machines, is relatively small and is declining.

Thus, the American Machinist 1968 Inventory of U.S. metalworking equipment reported finding "confirmation of the trend to milling for the production of flat surfaces. Both planers and shapers (except gear shapers) dropped in absolute numbers, and rank at the bottom of the list in the percentage of units under 10 years old. Only 6% of planers are under 10 years old, and only 11% of shapers, compared to 11% and 17% respectively in 1963" and compared to 32-40% for turning, boring, milling and drilling machines in 1968. In fact, during the past five years, the inventory of planers dropped 36% in number to under 9,000 and shapers dropped 17% to about 30,000.

Implications of Limited Market for Low Productivity Machines

Because of the limited market for these low productivity machines, it is not worth major expenditures on exhibitions and advertising to promote them in the first and second priority advanced market economies. There is, of course, a market for them in the developing countries, where they are more suited to prevailing economic conditions, but as this paper has already explained, the scale of those markets is too limited and the marketing problems too great to justify major promotional efforts.

7.2 Export Rights under Collaboration*

The range of machine tools which India can now export to the priority markets is limited because many of the machines produced under foreign collaboration cannot be exported outside of a limited number of markets under the terms of the collaboration agreements. It is only on centre lathes, milling machines, drilling machines, planers and similar machines, and, of course, machines designed indigenously or on which collaboration has ended, that export is generally unrestricted. However, even here, there are exceptions.

If exports were not restricted, a number of machines could be exported with relatively little modification in design. This would apply, for example, to vertical turret lathes, gear hobbing machines, single spindle automatics, capstan and turret lathes, and a number of other products.

It would be useful to try to secure the collaborators' agreement to export of such products, if necessary by renegotiation of the agreements and higher royalties on exports. The Government allows a royalty premium on exports of about 2% of sales value above the ceiling permitted for royalties on domestic sales. In a few cases manufacturers have already secured additional export rights. In 1968 one succeeded in getting export rights to Australia and another to East Europe and the UAR. However, it will be very difficult to get rights to North America and Western Europe.

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* See also, Reserve Bank of India, Survey of Foreign Collaboration, 1968.

It must be kept in mind that the collaborator may not be free to give unlimited export rights or even limited export rights to priority markets in two situations. First, licensing of designs for production in other countries is extremely common in the machine tool industry and in several cases, collaborators have licensed the same product for production and exclusive distribution in other countries. Therefore, they may not be able to give the Indian company the right to export to all markets. For example, the size 0 and 1 milling machines produced at Bharat Fritz Werner and the size 2 produced at HMT under license from Fritz Werner of West Germany are also produced in Yugoslavia and Brazil. Also, Fritz Werner is reported to be setting up an operation in West Asia. The gear hobbing machine produced by Cooper under license from Pfauter of West Germany is produced in West Germany and has also been licensed to Fellows in the U.S. The Verson presses licensed to HMT have also been licensed to Australia. The Traub single spindle automatics are also produced in several other countries, including West Germany, Szitzerland and Brazil, all with equity investment by Traub of West Germany. The Ex-Cell-O 602 milling machine is also produced in Canada.

Second, unless the design licensed is quite outdated, exports would compete with sales by the collaborator. There are many foreign machine tool companies, particularly in Europe, which depend on export more heavily than on their domestic markets, and these would be reluctant to permit export to their important markets. They license the production in India chiefly because India's policy of banning import of products competing with domestic manufactures leaves them a choice of no export to India or licensing production in India, from which they receive collaboration fees, royalties, and substantial orders for components in the initial years. However, unless royalties are substantial, they will be reluctant to license export to countries where they are otherwise able to compete from their own factory and have already invested in marketing efforts.

Implications of Limited Export Rights

Under these circumstances, one strategy would be for India to try to get export rights to certain limited areas, although more significant than the ones now typically given (e.g., Ceylon, Pakistan, Burma). For example, at a minimum India might try to get export rights to Australia and New Zealand in the case of collaboration agreements with continental Europe or to Europe in the case of agreements with Japan. Since these collaborators are in a relatively weak position in such markets, they would be more likely to give such limited export rights than unrestricted ones.

Because of limitations on export rights, a number of India's leading machine tool manufacturers are not in a position to export their more advanced products. This is true of the Cooper-Schiess vertical turret lathe, the Cooper-Pfauter gear hobbing machine, the Traub single spindle automatic, the Kirloskar-Herbert capstan and turret lathes, and a number of HMT products. Due to this constraint, the recommendations for promotion of Indian machine tools presented later in this report are more limited than they would otherwise be.

Considerations of developing new models for export leads to the problem that such developments will necessarily depend on collaboration lasting 5-10 years in many cases and yet collaborators often make restriction of export rights as one condition of the agreement. This leads to the question whether India should insist on overall export rights, and if so, how much royalty premium should be given for this. It is impossible to give a general answer to this question. Since insistence on export rights might prevent India from getting a collaborator and/or deal which was otherwise significantly better than the others available or the alternative of imitating a design without collaboration, it would not be advisable to enforce the policy of unrestricted export rigidly. Certainly the Government should allow Indian companies to offer significantly higher royalties on export sales than on sales in the domestic market, particularly if the Government simultaneously insists that export rights be given. A royalty premium of about 2-3% of export sales value is currently allowed by the Government.

7.3 Design Modifications Required for the U.S. Market

In order to succeed in international markets, Indian machine tool manufacturers have to match the designs of competing suppliers. Japan, for instance, has been able to make significant inroads in the standard general purpose machine tool market only because Japanese manufacturers have offered up-to-date designs which meet the needs of the end-users in the importing countries.

Short of the development of fundamentally different machine tool designs which would involve new types, workpiece capacities, and power/control systems, there are some cases where it would be advisable to change the basic performance characteristics on the basis of end-user research, of the machines now produced in India - for example, production per hour, tolerances etc. To illustrate, HMT found it necessary to incorporate a higher speed range of 30-1500 RPM in its M2 milling machine for the U.S., Canadian, and Australian markets. This involved redesign of the feed box, milling heads, and bearing arrangement. On their grinding machines, spindles were redesigned to increase accuracy. On the HMT turret lathe, the saddle apron and turret head were completely redesigned to make the machine more versatile. In general, however, HMT found the performance characteristics of their machines did not require basic changes for export.

Even where the basic performance characteristics of the machines are acceptable, there are some changes which must be made in Indian machines before they can be sold in the U.S. Moreover, there are a number of other modifications which would significantly increase the market for individual machines. In some cases, the modifications suitable for the U.S. would not be suitable for other export markets or India, e.g. electric current specifications or inch measurement. However, many of the design changes could be standardized for all production including export and the domestic market. This is what HMT is often doing.

The two modifications which are required to operate the machines in the U.S. are in the electricals and in the measurement scales. The electricals must be suitable for operation on electric current available in the U.S. and must pass very strict standards set by codes like that in Los Angeles, or Ontario in the Canadian market. Moreover, U.S. and Canadian users may specify particular brands of electric components. The general electric current requirement in the U.S. is 220 or 440 volts, 3 phase, 60 cycle and in Canada 550 volts, 3 phase, 50 cycles. The motors normally supplied with machines in India do not meet the safety requirements of the U.S. and Canadian codes, e.g. interlocks on motors.

Moreover, since work in the U.S. and Canada is still done in the inch system, all scales and dials (e.g. feed dials) must be in inches, with decimal breakdown for the U.S., and tool holders must fit U.S. tools. However, it is not necessary to make changes in the dimensions of the machine parts themselves as long as replacements are made available.

Although language presents no problem in the U.S. and Canada, instruction plates on machines have to be made in the language of the customer in the other priority markets.

Beyond these, there are a number of modifications which will considerably increase the market for Indian machines. Such changes must be made to achieve the volume of exports suggested in this report. The following are some of these modifications:

(1) Materials - Hardening

In India most users do not require hardened guideways on lathe beds or hardened cross feed screws. While hardening improves the wearing properties, it also makes it more difficult to restore the original precision once the parts wear, and hence parts may not be hardened for developing countries. However, hardening of these parts is standard in the U.S. market, and the major exporters from India to the U.S. have had to introduce hardening on their export models. In addition, at least one has increased the hardness of the castings used for export.

(2) Standardized Design Features

a) Spindle Nose: In India, lathe spindle noses are threaded while in the U.S. they are normally of a camlock design. Both HMT and Mysore Kirloskar have made this change.

b) Apron Handwheel: In India lathe handwheels for longitudinal movement on are on the right side of the apron while in the U.S. they are on the left. Again, both HMT and Mysore Kirloskar have made this change.

c) Tailstock Screw: For the U.S., tailstock screws should be left-handed.

d) Leadscrews: For the U.S. and Canadian markets, lead screws should be with Acme threads. HMT has made this change.

e) Electric Panel Board: For the U.S. and Canadian markets, electric panel boards, cabinet boxes, etc, should be located where they are easily accessible for maintenance and repair. This is necessary because high wage rates make repair very expensive if these components are not easily accessible. Thus, for export HMT has mounted some electric panel boards and cabinet boxes separately outside the machine.

f) Other Electrical Features: HMT has found that for the U.S., electricals must be exactly the same as those produced in the U.S., e.g. with regard to circuit diagram, colour of wiring, insulation, and circuit breakers.

(3) Appearance

a) Finish: For the Indian market, manufacturers have not given much attention to details of finish which do not affect the performance of the machine tool. At all stages, including foundry, machining of castings, assembly and painting, less care is taken with details of appearance than in the advanced countries. The result is that there is visible differences in the finish of castings, in sheet metal work, and in painting between Indian machines and those generally available in the U.S. Often the difference is due simply to more careful workmanship and consequently is not reflected in a price difference. Also, the appearance of some Indian machines would naturally lead a potential buyer to question the materials and workmanship of working parts of these machines. On both counts, sales of the Indian machines would suffer.

In fact the major Indian manufacturers who are exporting to the U.S., like HMT and Mysore Kirloskar, have consciously tried to improve the appearance of their machines. They have given more attention to details of finish, such as scraping of castings, and HMT has offered different colours of paint and provided chrome plated hand wheels and plastic scales for export.

One difficulty that has been encountered in attempting to improve finish is that paints and rust preventives available in India are not up to international standards, and as a result there have been complaints from customers. Paints are not durable and may chip, crack, or fade and the indigenous rust preventives do not protect fully for the six months that may be needed for shipment. However, the Government has given permission to one machine tool manufacturer to import rust preventives to be used for export.

b) Superficial design: In the U.S. and Canada, even the very conventional machine tools have been redesigned by many manufacturers to give them a more streamlined appearance. The lines of the machines have been straightened, angles squared off, and handles redesigned. Of course, some machines sold in the U.S., particularly imported ones, are not much more modern in appearance than many Indian machines. Nevertheless, Indian manufacturers will find a better market if they modernize the outward appearance of their machines. Compared to advanced countries, many Indian designs of conventional machines are 10 to 15 years outdated. In a number of cases in our foreign survey, we were told that the machines presented in the "Guide to Indian Machine Tools - 1968" date back to the Korean war vintage of machines produced in the U.S. Designs of many of these models have since been substantially modified.

Along this line Mysore Kirloskar has redesigned the handles for the carriage screw, compound rest, feed, and tailstock on its lathes. The cross sections of the rims of these handwheels were changed from round to square for export. The old oval-shaped headstock was changed to a rectangular flat type and the tailstock was made rectangular. HMT redesigned all the handwheels and levers on its grinding machines.

(4) Attachments and Accessories

It is important to offer attachments and accessories with the machines. Typically customers for standard machine tools want versatile machines and hence a range of attachments. There is a strong preference for ordering attachments and accessories with machines because this is easier for users than trying to arrange supplies from indigenous sources.

It may be noted that the extent of design modification required for most Indian machines is greatest for the U.S. and Canadian and U.K. markets, somewhat less for Australia, and even less for Continental Europe. This is partly because most Indian manufacturers produce machines under collaboration from Continental Europe, partly because of economic factors in these different markets.

7.4 Redesigning for Export - A Case Study

A useful example of the redesigning of machine tools required to make them more acceptable for export is provided by the changes made in a lathe manufactured by Mysore Kirloskar. Mysore Kirloskar initially exported its Harihar MBD cone-pulley lathe to the U.S. and Canada, sending 40 in 1963-64, 57 in 1964-65, and 18 in 1965-66. However, on the basis of the requirements of the U.S. market, the GD all-geared head lathe with the same swing over bed was redesigned according to specifications required by their U.S. distributor, and in 1965-66 the first shipment of 8 Kirloskar Western Type 'E' lathes was made. Their U.S. distributor subsequently placed an order for 600 Kirloskar-Western machines in addition to 120 Harihar MBD lathes to be shipped during 1967-68. Nevertheless, further modifications on the all-geared head lathe were considered necessary and in mid-1968 Mysore Kirloskar sent the first shipments of this third generation model, the Lapaz. These were favourably received by the U.S. distributors.

With this background, it is instructive to consider the design changes that were made during the evolution from GD to Western Type 'E' to Lapaz. Relevant specifications are listed in the Table on the next page.

7.5 Implications of Design Modifications Required for the U.S. Market

From the above discussion of modifications required for the U.S. market and the example given for a Mysore Kirloskar machine, it is clear that before any Indian machine (other than those developed with U.S. collaboration or with a view to export) can achieve substantial sales in the U.S. market, it will require changes on the order of those made between the Mysore Kirloskar GD and Lapaz models.

This means, first, that for each machine to be exported there will have to be overseas market research to determine the design modifications required. In the case of HMT, this has been done through their own field offices, through contract market research, and through distributors. Mysore Kirloskar was assisted in this respect by its first U.S. distributor. However, even these companies have not completed the required consumer research. It is imperative that other companies send design engineers for detailed studies of the needs of end-users abroad.

Second, it means the companies must have their own designers or have access to indigenous or foreign designers capable of making the required changes.

Design Modification in Mysore Kirloskar Lathe for Export to U.S.

Item	Madras-GD (Pre - 1965/66)	Western Type 'E' (1965/66)	Lapaz (1968)
1. Headstock	All geared	All geared	All geared
2. Swing over bed, mm	330	330	330
3. Bed gap	Optional	Not provided	Optional
4. Admit between centres, mm	600 1000	600 1000	
5. Net weight, kg			
600 mm	637	615*	
1000 mm	680	640*	
6. Horsepower	1	1.5*	2
7. Electrical equipment	Provided	Not provided	Provided
8. Speed range, rpm	48 - 1000	48 - 1000	58 - 1200
9. Feed range per spindle revolution:			
Longitudinal	.028 - 1.596	.028 - 1.596	
Transverse	.015 - 0.857	.01 - 0.543	
10. Bedways	Not hardened	Hardened	Hardened
11. Cross-slide screw and guideways	Not hardened	Hardened	
12. Spindle nose	Threaded	Threaded	L00
13. Diameter of hole through spindle, mm	41	41	38
14. Tailstock scale	No	No	Yes
15. Tailstock cross-section	Rounded	Squared Off	Squared Off
16. Handwheel rim cross-sections	Round	Square	
17. Location of apron handwheel for longitudinal movement	Right	Left	Left
18. Location of feed, reversing on headstock	Outside	Outside	Inside
19. Location of electric switch	On headstock	Separate bracket	On headstock
20. Toolpost type (and tool size)	Square (12.5 mm sq)	American (5/8"), with square (12.5 mm sq)	
21. Change gears			
Provided to cut	Metric threads	Inch threads	
Optional to cut	Inch threads	Metric threads	

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* Electrical equipment not provided with machine, and H.P. not specified in export brochure. 1 HP motor supplied for use in India.

Third, it means that from the time a decision is made to redesign the machines, one and a half to two years will be required before a number of companies have equipment available for substantial sales in the U.S. As a result, a number of Indian manufacturers will not have machines with designs suitable for export until 1971. It would easily take six months to determine what changes were necessary, another 6 - 12 months to make the design changes and put them in production, and another six months to send a sample to the U.S. for inspection and approval of a bulk order by the distributor. At HMT, incidental modification like a change in handle can be made in a couple of weeks, but changing a spindle or bed required 3 to 5 months for redesigning and beginning of production. Process time for a machine tool in commercial production at HMT is about 4 months from the foundry stage through testing. In the case of the Mysore Kirloskar modification of the GD lathe, each of the two model changes required about 18 months for re-designing, production, and shipping of samples.

Of course, if the design modifications are such that extensive testing of the performance of the new machine is required before it can be put into commercial production, the time lag would be extended. Additional delays are also possible if the materials and production facilities required for the new model are not available. Both of these delays were encountered at HMT in connection with redesign of a lathe; the first because there were important design changes, the second because the required material for steel strips and facilities for hardening were not available. Even now HMT does not have facilities for hardening and grinding the guideways on lathe beds with over 2000 mm between centres, and as a result it cannot export lathes with 2000 - 3000 mm beds to the advanced countries.

In some cases, it is also necessary to import materials, parts, and components required for export because they are not available in India and could be produced here only with a substantial delay and at high cost because of low volume. In such cases, the Government should be liberal in permitting imports. HMT has found it necessary to import certain electrical items for machine tools exported to the U.S. because of the strict demands of the market. This involves additional delays for import formalities and shipping.

Because of these problems, at least three manufacturers have exported machines without some of the electricals, which were subsequently fitted abroad by the distributor or collaborator.

Because of the need for design modifications before export, major expenditures on overseas sales promotion of Indian machine tools should be confined to products which have already been redesigned.

7.6 New Designs for Export

So far we have discussed the requirements for modifying the designs of machines produced in India to make them more suitable for the production requirements and tastes of the advanced countries. Another question is whether for export India should develop types of machines (e.g. more sophisticated power or controls, heavier, higher productivity, special purpose) which are not now produced in India.

In the light of the economics of machine development and production, it is concluded that at this stage it is not advisable for India to base the development and production of a model solely on the export market if the phasing in costs cannot be recovered fairly rapidly and with a high degree of certainty.

Of course, to the extent the machine would also have a domestic market and save on foreign exchange for imports or permit higher productivity than is possible with existing models, the burden of justifying the development on the basis of exports is reduced. On the other hand, where the domestic market would not justify the development of a model at the present time but would within a few years, the possibility of exporting a share of the product in the initial years may justify its early development.

In practice, India will not be in a position to begin commercial production of N/C machine tools for export or the home market until at least 1975. However, short of this, there are several directions in which designs could be developed with a view in part to export. One example is increased use of electric and hydraulic controls on general purpose machine tools, which will give them a higher production rate. Another is special purpose machines, including a wider range of tooling and attachments like hydraulic tracing equipment.

Another direction would be basic redesigning of conventional machine tools. For example, manufacturers of **planing** machines could design and produce plano-milling machines for which there is a larger market abroad. One possibility is to make conventional general purpose machines like small lathes for technical schools or ram-turret milling machines in accordance with specification of a foreign distributor who can guarantee a certain volume of sales. One machine tool manufacturer in India reported that a distributor had offered a large market for a simple milling machine designed and produced specially for U.S. customers.

India's competitive position is strongest for simpler machines, and despite the trends in demand abroad toward sophisticated machines, there is more to be gained from designing conventional machines for export than moving into very sophisticated equipment for which there is no domestic market.

In arriving at this conclusion, a primary consideration is the scarcity of domestic designing capability in relation to current requirements for diversification of production for the market in India. Moreover, apart from the overall supply of designers, even the best equipped Indian machine tool manufacturers simply do not now have designers with the experience to design very sophisticated machine tools like numerically controlled units. In fact, most of the better manufacturers do not have even the design capability to design a complicated standard machine like a gear hobber. Thus, development of designs specially for export would be dependent on foreign collaboration except for very standard types of machines like centre lathes and milling machines.

A second consideration is that the Indian machine tool industry is new to export and it would be too risky for it to invest in capacity and gear its production programme too strongly in that direction without adequate support in the domestic market. Particularly, given the high cost (e.g. $ 50,000 per unit), the vast majority of Indian manufacturers of engineering products will not be ready to use NC equipment efficiently for some time. This is true partly because of low labour wage rates, partly because of lack of knowledge of operation and maintenance, and partly because of lack of scientific production planning. One machine tool manufacturer reported that it has had one N/C machine installed since 1962 but it is hardly used because no one is accustomed to working with it. In fact, other Indian machines tool producers reported difficulties operating sophisticated machine tools even without NC. One company failed to commission two semi-automatic lathes for four years because of lack of training in their use, and several programme controlled machines installed in this company are used like conventional machines, without programming of machining cycles.

Third, even if the machine tool industry were in a position to develop new sophisticated machine tool types, India does not have the supplier networks required for quality supply of many of their parts and components, and import content would often be very high. It is not practical to develop only one or two models at a higher level of sophistication. Only when there is prospect of a demand for sophisticated hydraulic, electrical, and electronic components from a number of producers, is it profitable for a single producer to try to manufacture machine tools requiring such components for export. Companies now moving into designs using hydraulic components are already finding serious problems getting special hydraulic parts of adequate quality from local suppliers.

Fourth, because of lack of experience in building very sophisticated machines, it would be more difficult for the Indian machine tool industry to produce these at competitive prices than to produce simpler conventional ones.

Finally, because of their higher cost and service requirements, it would be harder to convince foreign buyers to take more complex machinery from India.

There is, however, one offsetting consideration. The Indian machine tool industry must look 5-10 years ahead in order to plan for and invest in capacity, in design and in areas like electronics which will be justified by future requirements of the home and export markets. Consequently, a leading firm like HMT which is already producing electrically controlled machines, should accept somewhat greater risks than other firms in developing a few items of advanced equipment, and in the absence of a domestic market, such equipment could initially be oriented toward export markets. Also CMTI,* which is now working on a simple NC panel, should develop its capacity along these lines.

However, it must be recognised that the leadtime involved would be at least five years, and consequently export of machine tool types radically different from those currently at least in the prototype stage will be negligible until 1975. Throughout the Fourth Plan period, India has hence the potential to export only conventional, general purpose machines.

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* CMTI stands for the Central Machine Tool Institute in Bangalore.

In this regard, it is important to note that at HMT, for example, export efforts have initially been concentrated on the established machine lines (LB and H lathes, M milling machine RM radial drills and G grinders). Even where export is not restricted on other models by collaboration agreements and distributors would like to offer the newer machines, HMT has held other models back until it is satisfied that they are thoroughly debugged, tested, and ready for export.

One machine tool producer reported that it is negotiating an agreement with a foreign company to produce a machine to the foreign company's design entirely for export through the collaborator's existing distribution system, with India replacing the collaborator's country as the source of supply to its international markets because of lower labour costs in India and scarcity of workers in the collaborator's country due to the immigration restrictions.

7.7 Products Not Made in India

Apart from these three limitations on Indian exports, another factor which must be kept in mind is that India simply does not produce machine tools of the types which account for the majority of machine tool sales in the advanced countries. In fact, India still imports about one-third of its own machine tool requirements by number and well over half by value.

Thus, India is not in a position to compete in a large section of the foreign tool markets.

Moreover, certain countries, particularly the East European ones, are not interested in importing standard general purpose machine tools which they can easily produce. They are interested in importing chiefly sophisticated machine tools of types not produced in India.

This makes the East European countries less promising than would be suggested by their volume of machine tool consumption and production costs alone.

Competition in General Purpose Machine Tools

Indian exporters should recognise that their major competition in the first priority markets comes not from new machines produced there but from imports from countries like Italy and Japan and used machinery. The advanced countries have well organised networks for rebuilding and distributing used machine tools.

7.8 The Fifth Plan and Beyond

It is imperative to devote resources to the development of new types of machine tools to prepare for future changes in the market both in India and abroad. There are excellent prospects for developing an export market in the advanced market economies for conventional general purpose machine tools during the Fourth Plan period. Further, if these efforts are successful, the Indian machine tool industry will have a solid technical and marketing base for diversification into new products and new markets. However, the trend in demand in the first priority markets is in the direction of sophisticated machine tools. The volume of demand for new general purpose machine tools of the types India now produces will decline in the advanced countries. At present, numerically controlled machine tools account for only 1% of the units and 15% of the value of new machine tools in the U.S. By 1975, numerically controlled machine tools are expected to account for 75% of the market in value. The Indian machine tool industry must prepare for this change in the nature of the market, if it is to sustain export sales during the Fifth Plan and beyond.

8. Export Target for Machine Tools

In its Report of July 1968, the Working Group on Machine Tools recommended a target of Rs 7.5 crores or $ 10 million for export of machine tools in 1973/74. Hindustan Machine Tools has set itself a target of Rs 5 crores or $ 6.7 million to be achieved in 1973/74.

If industry and Government adopt the measures that are recommended by this report, it is realistic to assume that exports will achieve a level of Rs 7.5 crores in 1973/74. Exports might be even higher if world demand for machine tools is unusually favourable - for example, if there is an increase in demand like that in the United States in 1965-66. However, India cannot plan on this.

It must be kept in mind that it will require much of the Fourth Plan period for India to develop designs suitable for the advanced countries, to develop an export marketing organisation, and to build its image as a supplier of quality machine tools. The results will only begin to show in 1973/74. With continued effort, exports of machine tools could be increased to as much as Rs 15 crores in 1975/76. Thus, efforts during the Fourth Plan to promote exports of machine tools must be looked at in part as a long-term investment which will achieve results during the Fifth Plan.

The various factors that are involved in the achievement of this export target are discussed in the following pages.

8.1 The Market Potential for Specific Indian Machine Tools in Specific Foreign Markets

To estimate the potential market for Indian machine tools in each country, we have used available statistics for 1967 broken down by type of machine tool for production, inventories, and the pattern of imports of the country in question.

For the purpose of the exercise presented here, a detailed analysis is made only for the priority markets and only for the range of products now available for export from HMT and Mysore Kirloskar, together with a few machines of the same basic types but smaller sizes than HMT offers (e.g. 0-1 knee type milling machines). This analysis is only illustrative and not exhaustive. In addition to HMT and Kirloskar, there are several firms who are potential exporters - Perfect Machine Tools Co.; Telco; Cooper Engineering: Godrej and Boyce; Beco Engineering; New Bemco Engineering Products; P.S.G. Industrial Institute and Malik Electric Works. However, it is assumed that other Indian manufacturers will soon carry out the design modifications required to make the machines in their product range acceptable in advanced countries. Further, other machines will become exportable when collaboration agreements end or collaborators give permission for export.

On the basis of the product development and actual exports of HMT and Mysore Kirloskar, it is assumed that Indian manufacturers can now supply light, medium and medium-heavy duty machines of the following categories and specific types:

Category	Specific type
Lathes	centre
Lathes	turret
Milling machines	knee-type
Drilling machines	radial
Grinding machines	cylindrical

This means, in particular, HMT's LB, H, L, M, E, RM and G lines and Mysore Kirloskar centre lathes, plus the Kirloskar-Herbert turret lathes in the case of Australia.

Table 1, which follows, presents estimates of the export target. Of the export target of $ 10 million for 1973/74, $ 7.3 million is for the present range of products exported from HMT and Mysore Kirloskar to the priority markets. The other $ 2.7 million is partly for HMT and Mysore Kirloskar machines of other types and in other markets, but it is largely for the rest of the machine tool industry. There are a number of companies which should be able to export about $ 0.1 to 0.2 million (Rs 7.5 to 15 lakhs) annually by 1973-74.

The next table 2 gives a more detailed analysis of the first priority markets for the range of HMT and Mysore Kirloskar machines presently ready for export. This shows that the total market in all six countries for these five basic types of machines is $ 199 million per year; this volume, incidentally is only 6% of the total market for machine tools in these countries. The market value of $ 199 million is calculated using the average value of imported machines; the value would be higher if the average values of domestically produced machines were used. The target of $ 7.3 million from HMT and Mysore Kirloskar together is approximately 3.6% of the 1967 market for these basic types in the six countries. For HMT alone it is about 3.1% of the market for the five types of machines, while for Mysore Kirloskar it is about 1.5% of the total market for centre lathes in these countries plus the Australian market for turret lathes.

Table 1

Export Target for Indian Machine Tools, 1973-74

	Number of Machines	Average value F.O.B. US $	Total Value F.O.B. million US $
I. Grand Total	3365	2972	10.00
II. First Priority Markets	2365	3598	8.50
1) Present Range of Products	1865	3850	7.30
(H.M.T.)	(1250)	(5000)	(6.25)
(Mysore Kirloskar)	(615)	(1700)	(1.05)
2) Other Products of HMT, Mysore Kirloskar, and other Manufacturers	500	2400	1.20
III. Other Markets	1000	1500	1.50

TABLE 2

Estimated Size of Market and Target Sales for Target Product Groups in First Priority Markets

	Types of Machine Tool		Size of Market in Terms of Units					Average value per unit $	Total value of market (Mill of $)	Share of Market
			US	Canada	W. Germany UK, France	Australia	Total			
1)	Centre Lathes ..	..	10,000	2,000	9,000	1,250	22,250	3,000	66.75	
2)	Turret Lathes ..	..	2,000	250	2,250	200	4,700	6,000	28.20	
3)	Knee Type Milling Machines	..	10,000	500	7,500	500	18,500	4,000	74.00	
4)	Radial Drilling Machines	..	1,250	200	1,500	150	3,100	4,000	12.40	
5)	Cylindrical Grinding Machines	..	1,250	150	1,500	75	2,975	6,000	17.85	—
6)	Total : Volume ..	..	24,500	3,100	21,750	2,175	51,525			
	Value (Millions of $)	..	94.5	11.2	85.5	8.0	199.2		199.2	
7)	Target for HMT:									
	Volume (Units) ..	..	600	100	450	100	1,250			
	Value (Millions of $)	..	3.0	0.5	2.25	0.5	6.25			3.1%
8)	Target for Mysore Kirloskar:									
	Volume (Units) ..	..	300	60	180	75	615			
	Value (Millions of $)	..	0.5	0.1	0.3	0.15	1.05			1.5%
9)	Total of (7) and (9):									
	Volume (Units) ..	..	900	160	630	175	1,865			
	Value (Millions of $)	..	3.5	0.6	2.55	0.65	7.3			3.6%

8.2 Capacity Available for Export Production

The production capacity for machine tools in 1973-74 on the basis of plant and equipment installed, balancing equipment, and new units already committed will be sufficient to produce Rs 15 crores of machine tools for export. Moreover, the excess capacity is distributed virtually throughout the industry, and the firms which have the greatest export potential and which will account for the bulk of the exports may have sufficient excess capacity to meet the target of Rs 7.5 crores, particularly if they increase their productivity. As a result, during the Fourth Plan, production capacity may not restrict the level of exports. The situation depends on the extent to which existing excess capacity is put to use through diversification programmes. In case expansions of capacity is necessary, this would not have to be undertaken until later in the Fourth Plan.

	Existing Capacity of Organised Sector 1968-69	With Balancing Equipment	With Balancing Equipment and Committed New Units*
	Rs crores	Rs crores	Rs crores
Private Sector	23.0	28.0	28.0
Public Sector	38.0	38.0	48.0
Total ..	61.0	66.0	76.0

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* The committed units are the Machine Tool Corporation at Ajmer and HMT-Verson. On April 5, 1965 an agreement was signed with Czechoslovakia for assistance in establishment of two machine tool plants, one for grinding machines at Ajmer in Rajasthan (i.e. the MTC) and another for medium heavy machine tools at Bhavnagar in Gujarat. It is assumed the Gujarat unit for HMT and other units originally scheduled one per year in the Fourth Plan will be postponed until the Fifth Plan. In fact, apparently even the HMT-Verson unit may be postponed, with production of presses at the existing Hyderabad unit instead.

It will be possible to achieve an output of Rs 76 crores in the organised sector in 1973/74. The exact capacity will depend on measures taken to increase productivity. It is anticipated that annual demand for machine tools will at most be equal to the level of capacity, and that 25% of this, or Rs 19 crores, will be met by imports. Allowing for the difference of domestic and export prices, this means that an annual production capacity of about Rs 15 crores, including Rs 7.5 crores in firms with export potential, will be available for export, without any additional investment that is not already committed other than balancing equipment.

8.3 Gestation Period for Product Development

Even an intensive and well-organised effort to export machine tools requires several years to achieve full results.

The Indian machine tool industry has machines which are basically suitable for export and which can achieve substantial sales abroad provided required design modifications are made. We have recommended both indigenous redesigning and liberal licencing of foreign know-how so that Indian machine tools will meet the requirements of the major exports markets in the advanced countries. Where such redesigning has not already begun, the time requirements will impose a limitation on the export success of many firms until the end of the Fourth Plan. Depending on the nature of the design change, it takes a minimum of a year and as much as five years from the time design work is begun, until exports can be undertaken. Moreover, for a number of manufacturers redesigning is necessary before sales promotion can be undertaken.

8.4 Gestation Period for Market Development

There is a similar incubation period for market development. Except for cases where distribution has already been established, three years will be necessary to establish overseas distribution and undertake sales promotion before substantial results can be achieved. It will thus take five years before India is widely accepted as a reliable supplier of quality machines. Because of the low level of India's present marketing knowledge, experience, and organisation coupled with the problem of India's image abroad, it would be unrealistic to set an export target higher than Rs 7.5 crores for 1973-74.

In considering the rate at which India can expand its exports, it is instructive to examine the Japanese experience, for both total exports as well as exports to the U.S. market.

Japan's Production and Export, 1959-67

(Value in US $ million)

Year	Production	Export	Export as Percent of Past Peak Production	Export to U.S.
1959	67.6	1.4	2.1	
1960	125.5	4.5	3.6	
1961	227.5	6.7	3.0	0.3
1962	280.2	7.2	2.6	N.A.
1963	264.3	11.9	4.3	N.A.
1964	252.5	18.2	6.4	2.0
1965	195.4	24.8	8.9	5.0
1966	212.4	40.3	14.5	17.0
1967	346.0	51.7	14.9	26.0

In the 1950's Japanese exports of machine tools were $ 1-2 million per year. Japan began its intensive efforts to export machine tools about the year 1960. It was six years later that Japan first exported machine tools worth more than 10 percent of its annual productive capacity. Moreover, while Japan started promoting machine tools in the U.S. in 1960, it took four years to reach a level of $ 2 million, although exports increased very rapidly after that in a period of very favourable demand in the U.S.

Although certain conditions are more favourable now than when Japan started exporting (world demand is now higher, the U.S. has come to accept imported machine tools, and trade barriers are being reduced after the Kennedy Round), on balance, Japan was in a more favourable position in 1960 than India is at the start of the

Fourth Plan. In 1960, Japan had more experience in exporting machine tools (with a total of $ 11 million in exports in the 1950's) than India has had, had a better image as a supplier of engineering goods, had a highly developed network of export houses which undertook the task of marketing machine tools abroad, and had a more advanced industry in size and range of production. Moreover, world trade in machine tools is now more competitive.

9. Marketing Channels

There are several different forms of export marketing organisation that could be used by Indian machine tool manufacturers in a priority market like the U.S. At one extreme in terms of control over the marketing operation is establishment of a branch marketing organisation in the target market. A variant on this is the Japanese system, which typically includes a branch of a Japanese trading house apex organisation in the U.S. to act as the national-level importer, stocking machines and parts and providing back-up service.

A second pattern is to appoint one or more distributors in the U.S. to act as a national or regional importer and distributor. Such a distributor might sell machines in its own area, but it would also function as a representative of the manufacturer, supplying market information, handling details of importing, stocking of machines and parts, provision of back-up service, and appointment of a network of distributors for different parts of the territory. In some cases, it might be possble for a foreign collaborator - either the parent or subsidiary company - to act as the national importer-distributor.

A third set-up for export marketing is the one used by many Italian and some Japanese manufacturers. There are a number of large machine tool dealers in the U.S. who assume complete responsibility for marketing, with the task of the foreign supplier limited to production. These dealers place bulk orders with foreign manufacturers for standard machine tools built to their specifications and sell them under their own brand names rather than the manufacturer's names.

In addition to this choice among overseas sales channels involving different degrees of control over the marketing function, there are alternatives for organising machine tool export efforts which involve different degrees of cooperation among the Indian firms. At one extreme would be complete independence in export efforts, both with regard to channels and promotion.

It would also be possible to have joint efforts in certain aspects of the export effort, such as organising participation in exhibitions, visits of foreign machine tool distributors to India, or overseas show rooms.

Manufacturers can entrust export to Indian trading houses or form a consortium or consortia of machine tool manufacturers, and even entrust the consortium manager and staff with formulation and execution of the export strategy, including appointment of overseas distributors, for a number of firms. One such consortium (AMTEX) of non-competing lines is now in the process of formation for export to the U.S.; possible members in India include Beco, Cooper, Ex-Cell-O and Godrej. One prominent Indian machine tool exporter reported that a manufacturer of non-competing machine tools had approached it to become the export agent for the latter's products, and this was under consideration.

Because of differences among Indian machine tool manufacturers, different export patterns will be appropriate for different companies. Thus, HMT can offer a variety of products and operate at a scale considerably greater than other manufacturers. Mysore Kirloskar and Telco belong to industrial groups with substantial export organisations for other products. Bharat Fritz Werner, Traub, and Ex-Cell-O are partly owned by foreign machine tool companies with very substantial international operations.

9.1 Apex Organisation Overseas vs. Reliance on Local Distributors

Although it may be useful for Indian manufacturers to maintain offices in the target markets, and in some cases to operate showrooms and warehouses, they should not initially attempt to match the Japanese style apex marketing organisations.

Japanese trading houses are able to operate in this fashion because they handle exports of several machine tool manufacturers and of numerous other firms in a wide range of industries, and hence they are able to spread overhead costs and risks. Indian manufacturers do not have such a system of trading houses available to them.

Establishment of an apex organisation with major responsibility for the detailed work of marketing Indian machine tools would have the disadvantages of relatively high overheads, delays, and lack of local contacts and market experience. Under the circumstances, it would be preferable to operate through established importers/ distributors supplemented with a small marketing-cum-technical cell of Indian executives for liaison and feedback of market intelligence to the domestic production units.

Of course, Indian companies which have tried to appoint distributors have often found it very difficult to get good ones to handle their products. This difficulty should be reduced if Indian manufacturers redesign their machines for export and offer significantly larger commissions or discounts than competitors, as was done successfully by the Japanese.

There is no substitute for good distributors, however, if India is to secure substantial export markets. It would be extremely difficult for Indian manufacturers on their own to,mount a promotional compaign to establish among the mass of machine tool users an image for India as a reliable supplier of quality machine tools. However, if Indian manufacturers can secure good distributors with established clientele, this would give access to a substantial universe of customers who buy partly on the strength of the distributor's reputation.

Even if Indian manufacturers rely primarily on local overseas importer/distributors, it is essential to establish offices with a small complement of technical and marketing experts in a few strategic locations in the world, e.g. one in North America, one in West Europe and one in Australia. HMT has already set up offices in the U.S., West Germany, and Australia and Mysore Kirloskar can use the overseas offices of other Kirloskar companies, particularly Kirloskar Electric, which is under the same mamagement. Similarly, Telco can use the Tata export company offices, such as those in the U.S., West Germany, UK and Switzerland. Even small offices would be expensive for the other Indian companies, but a consortium might set up such offices to handle the business of several companies. Although showrooms might more appropriately be operated by distributors, it would also be possible for individual firms or a consortium to operate showrooms or even warehouses.

9.2 Export through Collaborators

A few Indian machine tool companies have sold machines through their collaborators, particularly where there is an ownership tie, but also in purely technical collaborations. In some cases the collaborator has bought the machines out-right while in others it has channelled some of the orders placed on it to the Indian firm. In either case, the collaborator has taken care of marketing, including after-sales service.

The collaborator of one Indian company has bought a total of forty machine tools for about Rs 6 lakhs while the collaborator of another ordered 75 machines valued at Rs 7.7 lakhs. In the first case, the collaborator used at least some of these in turn-key projects it was responsible for in other developing countries, and apparently the collaborator supplied the machines to the user as if they were produced by it rather than in India. The machines in question were a size and model no longer produced by the collaborator, and presumably this is the major reason they were taken from India.

The collaborator of another firm channelled orders for 28 machines valued at about Rs 5 lakhs during the past couple of years to the Indian company even though the same machine is produced by the collaborator abroad. This was done because the collaborator had a large backlog while the Indian company had substantial excess capacity, and thus delivery could be made faster from

India. In addition, although some of the orders given were for distant markets like the U.S. and West Germany, most were for markets near India like Hong Kong, where the Indian company had additional advantages of lower freight charges and shorter shipping time. It should be added that the collaboration agreement does not allow export by this Indian company outside a few developing countries without the collaborator's consent, and even with its consent the machines are sold through the collaborator's world-wide distribution system. Where exports have been made, the price charged has been less than it would have been from the collaborator in order to convince buyers to accept the Indian machines. One reason for this is that the bought-out Indian castings are not finished as well as those used by the collaborator. In the case of machines supplied from India to the collaborator's country, the machines were sent without electricals, which were added abroad by the collaborator. In addition, the Indian manufacturer is supplying machine tool components to its collaborator, which produces the same machine tool abroad.

Overall, the volume of machine tools being sold through collaborators is not very high, and only one machine tool manufacturer indicated hopes that this would be a major export channel. The greatest potential is where the collaborator has an equity investment in the Indian company. For example, a company like Bharat Fritz Werner, Traub India, or Ex-Cell-O India might get the benefit of their collaborator's assembly, sales and service operations in North America. One limitation on the potential help the collaborator can give is that most companies sell through independent distributors and they generally have no power over the products the distributor will handle. The fact that the distributor handles products of companies from the U.S. or Europe does not mean they would take products from the collaborator in India even if they have the same design.

Another limitation of exporting through the collaborator is that this would not provide an export channel for machines with indigenous designs, and hence, especially for a firm with several collaboration agreements, there would be duplication of marketing efforts.

In addition to sales of finished machines through collaborators, two machine tool producers with their own foundries have sent sample orders of finished machine tool castings to their collaborators to see whether arrangements could be made to supply their requirements for castings from India. There are a number of machine tool producers abroad who might be interested in this because they buy their castings out any way. However, with the exception of a few machine tool foundries, the quality of Indian castings is not high enough. In fact, one machine tool firm with its own foundry reports that its collaborator is interested in buying castings from India but the Indian company has not been able to produce castings which it considers to be of high enough quality.

Another manufacturer, in addition to the one mentioned above, has supplied machine tool components other than castings to its collaborator abroad. However, the collaborator has decided not to place further orders because of the long delivery period and large amount of paper work involved.

9.3 Sales Under Indian Brand Names

Both HMT and Mysore Kirloskar have invested enough in developing markets for their products in the priority markets that thay should continue their export drives using their own brand names.

However, Indian machine tool manufacturers which have not yet developed export distribution systems might consider the alternative followed by a number of Italian and other Southern European companies and some Japanese companies in the U.S. market. These firms produce machine tools to specifications provided by the dealers. The machines are chiefly standard medium centre lathes, milling machines and radial drills. The dealers make bulk orders, stock the machines in the U.S. for immediate delivery and take care of all the selling and servicing.

A number of Indian firms have indicated their willingness to use this channel. HMT reported that a U.S. dealer was interested in importing HMT machines in bulk for sale under another brand name, but HMT was not interested in this channel.

The advantage is that such an arrangement could give a relatively quick market. It would still be necessary to redesign machines, but this arrangement would cut short the research necessary to discover the design changes necessary. Moreover, once the new design was put into commercial production, the dealer might well be able to take all that a medium sized Indian company could produce beyond its sales in India, since the market for the standard machines in the priority market is very high in volume.

The disadvantage of this channel is that the Indian company does not build up a reputation for its own brand and does not build a close relationship with the market. If the dealer finds a cheaper supplier for the machine, it can simply change sources, leaving the Indian company without a market or marketing channel.

Nevertheless, this is a sensible initial channel for Indian companies without extensive resources or experience in export. Such companies cannot afford to build reputation in the large priority markets for their brands anyway. The overhead costs of building up a brand name for a machine tool company that might sell 10 lakhs a year in a foreign market would be prohibitive. It would appear more reasonable for such companies to focus on getting distributors with experience and regular clienteles than on buiilding their own brands. Of course, it is possible that a distributor with comparable resources might handle Indian machine tools under their own brand names. The reason some do not do this for imported machines is partly to avoid foreign-sounding names for machines but, more importantly, to build a clientele for the distributor's brand name rather than that of the foreign supplier, who could otherwise let the distributor's contract lapse and use some other channel to exploit the market built for its machines by the dealer.

9.4 Efforts Required to Secure Good Distributors

We have emphasised the importance of good distributors. For standard machine tools produced by unknown suppliers with a limited range of products and limited resources to invest in promotion, there is little hope for success in export without good distributors.

On the other hand, with good distributors who have established reputations, it would be possible to supply machines in a volume which, while minute in comparison to the priority markets, would be very significant in terms of the Indian export target of Rs 7.5 crores or the productive capacity of individual Indian firms.

Sales promotion in the form of advertising and exhibitions would still be necessary, but by advertising Indian products along with the names of established distributors it would be possible to achieve results without independently building a reputation for all the Indian brand names.

Stimulating Distributor Interest

It follows from the importance of securing good distributors that a significant share of India's machine tool export promotion budget in the initial years must be focussed on convincing distributors to handle Indian products.

First, it must be attractive for distributors to handle Indian products. This means the prices charged to distributors must be low enough so that they earn a higher markup on Indian machine tools and yet can sell them to the end user at prices below those of competitors. Moreover, the Indian manufacturers will have to agree to support advertising and exhibitions to promote their products. It also means that the design and quality must be suitable for the market.

Second, even before Indian machine tool companies have completed the redesigning of machines for export, potential distributors should be located and invited to India to visit the production facilities. In fact, since distributors would be able to assist in providing the market information on which redesigning is based, efforts to locate distributors could be begun right away.

Both HMT and Mysore Kirloskar have found that if they can get a distributor to come to India to see their production and testing facilities, the distributor is always impressed with their capacity to produce quality machine tools, and several have become distributors. Also the opportunity to meet personally contributes to the success of the business relationship.

As a result, we recommend that resources be devoted to locating suitable distributors to invite and to pay the expenses of their trip to India. The IMTMA*has submitted a proposal to the MDF* for a subsidy of the expenses to bring 12 distributors (with wives) to India to see its members' plants. We recommend that such a programme be carried out with subsidy from the MDF (although the IMTMA should bear the expenses for wives without subsidy) after a detailed proposal is drawn up, giving names of distributors who would be interested, a resume of the types of machines they handle and the users and geographical areas they serve, and a list of the Indian manufacturers they might be interested in representing. According to IMTMA's application, this would cost $ 14,000 in foreign exchange plus Rs 44,900 (or Rs 89,800 if wives are included), a total of Rs 1.5 lakhs (or Rs 1.95 lakhs with wives). While 12 distributors is a reasonable initial number, it would not be necessary for them to come together or to follow the same itinerary in India.

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* IMTMA is the Indian Machine Tool Manufacturers' Associations.
MDF is the Marketing Development Fund set up by the Government of India to aid Indian exports. (See Section 10.2 on page 88)

9.5 Marketing Channels through East European Agencies

There has been some interest in East Europe in buying Indian machine tools on rupee payment and selling them in third countries, at least sometimes for hard currency. One East European country expressed interest in selling the machines produced by its Indian collaborator in third markets, chiefly developing countries. They apparently were thinking in terms of supplying the machines marked as though they had been produced in East Europe. In a second case, another Indian manufacturer almost made an agreement with Strojimport of Czechoslovakia under which the latter would have had exclusive export rights for its machines except for selected markets where the Indian company was already established at the time. Because of Strojimport's world-wide distribution system and reputation for machine tools, this would appear to be a good way for an Indian company to export to its low priority markets. A major drawback and reason for failure of the agreement was that Czechoslovakia refused to pay for the machines in the same currency received for sale, insisting all payments to India to be made on rupee account. Although the Indian Government might allow some payments in rupees, on the basis of the Government's policy against allowing switch trading under bilateral agreements, it is very doubtful that it would allow a distribution agreement which did not give India hard currency for most of the sales actually made against free exchange.

Nevertheless, the possibility of exporting to some areas through the East European distribution system merits careful consideration. Even if a suitable arrangement cannot be worked out for marketing in this way to hard currency areas, it would be a possibility for rupee payment areas or areas where shortages of foreign exchange would prevent purchase with free exchange. This could well be a very satisfactory method of marketing as it provides Indian machine tools the advantage of a well established distribution system with facilities for after-sales service and the benefits of direct customer contact.

Similarly, it might be possible to export to a number of countries through West European export houses. For example, it might be possible to export to former British colonies through a UK trading company.

10. India's Image as a Machine Tool Producer

In order to achieve the export targets suggested in this report, India must invest in image building to project its technological capability to potential export markets. To put it baldly, few abroad believe that India has a machine tool industry, let alone that it is capable of producing high quality products. Nothing is known of the changes in India during the planning period. Unless this psychological barrier, caused by ignorance and the popular view that India is a land of elephants, snake-charmers, and famines is broken, the export drive for machine tools and engineering products as a whole will not take off.

The only means of oversoming this difficulty is advertising and promotion. The Government of India can play a valuable role in this area as other Governments, notably Japan through JETRO, have done, by providing both liberal release of foreign exchange and subsidies for export market development and sales promotion.

Before detailing recommendations on export market development and promotion, it is important to define the goals of these efforts.

India is not in a position where it can or should undertake a massive sales promotion campaign of the magnitude of the Japanese. India does not have the range of consumer and capital goods suitable for export that Japan has. There is neither the objective basis for a reputation of the type Japan has built nor the capacity to take full advantage of such a reputation. The expense would be prohibitive. Hence, the Indian efforts should be more modest.

The Indian sales promotion efforts should be very selective. Until a company has a machine designed for export, expenditure should be concentrated on market research and redesign. Perhaps overlapping the redesigning stage, efforts could be given to securing experienced distributors. Only then should major expenditures be made on advertising, exhibitions and similar publicity.

Even for the companies which do engage in sales promotion, the objectives will be modest. The purpose of advertising and promotional activities should be to inform distributors and users of conventional machine tools that India at this stage is best equipped to deliver, complete with working demonstrations, and in some cases, visits to the production facilities in India. Apart from this basic purpose of information dissemination, the major emphasis should be on securing distributors with business contacts, service facilities, and a good reputation with users. If these steps are taken, India should succeed in achieving a target of Rs 7.5 crores of machine tool exports in 1973-74.

10.1 Availability of Foreign Exchange for Export Promotion

Release of foreign exchange for export promotion is under the jurisdiction of the Reserve Bank of India, Exchange Control Department, although policy decisions are also made in the Ministries of

Finance and Commerce. The Reserve Bank sanctions blanket releases of foreign exchange for six month periods to export houses recognised by the Ministry of Commerce and to exporters of non-traditional goods with Rs 5 lakhs or more of exports in the previous year. The blanket permits cover expenditures for business visits, market studies, advertising, participation in exhibitions, samples, and securing technical information relating to export products. There is no fixed rule for determining the value of the blanket release given to a firm, but the Reserve Bank determines the sanction largely on the basis of past export performance. One machine tool manufacturing firm said that its sanction was for 5 percent of the value of exports of the previous year, although more had been requested.

Sanctions for use of foreign exchange for export promotion by firms with exports of less than Rs 5 lakhs in the previous year are made on a case-by-case basis and only for a specific use, such as a particular business trip or participation in a particular exhibition. Firms can submit their applications directly to the Reserve Bank, but the preferred procedure is to submit proposals through the appropriate Export Promotion Council, the EEPC in the case of machine tools. This procedure is preferred because the EEPC must scrutinise the proposals to make sure they do not duplicate activities of the EEPC. When a proposal is submitted to the EEPC, the EEPC makes a recommendation to the RBI on the sanction of foreign exchange.

In practice, some machine tool manufacturers have experienced considerable difficulties with foreign exchange availability for export promotion. One problem arises from the guideline that the blanket foreign exchange sanction is limited to a certain percent of export earnings of the previous year. At the existing levels of exports, even firms with over Rs 5 lakhs of exports find this percentage too small to permit the expenditures necessary to build a market abroad in the initial years of export promotion. Thus, HMT exported about Rs 40 lakhs in 1967-68 and Rs 100 lakhs in 1968-69, but it spent over Rs 15 lakhs in foreign exchange on export marketing and promotion in 1968-68 and would have spent more if it had not been for Government restrictions. For a company just entering export, this means that little or no foreign exchange is available for market development purposes. For example, in the case of one company which began trying to export machine tools in 1967 and had not yet reached Rs 5 lakhs in 1967-68, the Reserve Bank denied a request made by the company in 1968 to release $ 2500 in foreign exchange for a specific overseas sales promotion activity with the explanation that such a request could be entertained only after the company had made "sizable exports".

The firms, which said they had no difficulty in getting the foreign exchange allocations they wanted, were ones with substantial exports of products other than machine tools, or companies which were promoting sales on only a limited scale. On the basis of their export performance in other products, they were given foreign exchange which could be used to promote machine tool exports. Moreover, the expenses of business trips and overseas offices could be distributed over a range of products.

Apart from the overall allocation of foreign exchange for export promotion, there were virtually universal complaints about limitations on per diem expenditures during overseas business trips connected with export.

For machine tools, where it takes perhaps five years and substantial foreign exchange expenditures on promotion before the product is accepted fully in export markets, the policy of tying foreign exchange release to past export performance or even the target of the coming year could well prevent success in export. It should be emphasised that other countries exporting machine tools spend large amounts of foreign exchange on export promotion, and do so very heavily in relation to the volume of exports in the early years when they begin to penetrate a new market. Japan is the most impressive example, but the same applies for other countries. It would be advisable to allow very liberal release of foreign exchange for expenditures on market research and establishing business contacts, overseas offices and a distribution network. In the case of expenditures on promotion through advertising and exhibitions, the criterion for release of foreign exchange should be not past export performance but whether the firm has laid the necessary groundwork for export in terms of redesign of machines, market research and formulation of a marketing strategy. Where these have been done, release of foreign exchange should be very liberal.

10.2 Marketing Development Fund

In July 1968, the Ministry of Commerce announced a Code of Grants-in-Aid for export promotion available from the Marketing Development Fund (see Appendix 4). Grants are available for sending delegations and study teams, market studies, publicity and participation in exhibitions, and similar activities to promote exports. We recommended that this fund be used to subsidise the market research and export promotion efforts by the machine tool industry suggested later in this report.

It is understood that for 1968-69, the MDF was allocated Rs 40 crores, compared to Rs 24 crores in 1967-68. However, these allocations are flexible and are given only to indicate the order of magnitude. Decisions on the allocation of funds are made by a Committee composed of two Secretaries from the Ministry of Finance and one from the Ministry of Commerce. Assistance is available both to organisations given a special "approved" status by the MDF and to associations and exporters who are not eligible for the special "approved status". The difference is that "approved" organisations are given a grant on an annual basis for their activities and have discretion on how they spend it to achieve the overall purposes for which it is given. Others are eligible only for grants for specific promotional projects.

Approved organisations include the STC and the EPCs. It has been decided that trade associations, chambers of commerce, and individual exporters will not be given "approved" status, and the IMTMA's application of November 2, 1968 for approved status was rejected. As of January 1969, the only disbursements from the MDF were to approved organisations. Others who are not approved, reportedly have been slow to submit proposals, and those received are initially taking some time to process because the programme is new and guidelines for the use of funds must be established.

However, the intention is to make funds available selectively to associations or individual exporters which have a good export potential (especially if they have also a good past export performance) and sound programme of export market development but which are not adequately handled by the inclusive approach of the Export Promotion Councils or the agencies in charge of Indian participation in overseas exhibitions.

In general, applications made for grants from the MDF by organisations or exporters which have not been given "approved" status, should be submitted through the appropriate EPC for its scrutiny to make sure the application is not made for a purpose adequately covered by the EPC's own activities. However , the decisions on allocation of funds are still made by the MDF committee, and applications may be submitted directly to the MDF (Attention: Mr.A.C. Banerji, Joint Secretary, Ministry of Commerce).

For example, it is considered appropriate for applications by trade associations, like IMTMA, which are not themselves exporters or members of an EPC, but which propose to undertake market research or sales promotion on behalf of their members, to submit proposals directly to the MDF. It is also appropriate for a proposal by an individual machine tool producer with substantial exports, like HMT or Mysore Kirloskar, or an export house to apply directly to the MDF for grants for purposes like participation in specialised machine tool exhibitions in the advanced countries.

On occasion the Government has suggested that it would be more generous with subsidies for certain industries if they would join together in export consortiums. Although any machine tool export consortium would be limited by the fact that HMT and Mysore Kirloskar may not be members, an export consortium of machine tool producers might receive favourable Government treatment. This, in fact, would no doubt be one of the motivations for forming a consortium.

In November 1968 the IMTMA submitted a request for a grant-in-aid from the MDF (See Appendix 5). As of the end of January 1969 this application was under consideration and was slated to go before the MDF committee at an early date. The outlook was for a grant of only a small fraction of what was requested, e.g. Rs 2-3 lakhs compared to a request of Rs 24 lakhs. Despite the terms of the MDF code, which suggest subsidies of about 75%, the Government plans to limit its subsidy to 50% of expenditures. Thus of the Rs 30 lakhs expenditure proposed by IMTMA, the Government would consider upto Rs 15 lakhs subsidy, and a subsidy of this magnitude in some form was not considered out of the question for the promotion of machine tool exports.(1)

NOTE: (1) After this report was written, the following item appeared in the press:

GRANT-IN-AID TO TOOL UNITS SMALL

New Delhi, Feb. 26 - An unprecedented incident marked the proceedings of the 22nd annual general meeting of the Indian Machine Tool Manufacturers' Association here today. Mr Jayant H. Shah, President of the Association, publicly announced that pending a decision tomorrow, the association would reject the 2 lakh initial grant-in-aid made available to it by the Union Government, as it was "too inadequate" and "ill-timed". The grant is intended to enable the Association to participate in the forthcoming Paris machine tool exhibition, visit to India of foreign experts, and cover in part the Association's expenditure towards bringing out a publication entitled "Guide to Indian Machine Tools". (*Financial Express*, Feb 27, 1969).

However, it was felt that only certain types of subsidies should be given to a trade association, because such an association inevitably has many members whose products and export potential do not warrant their promotion. Thus, while a survey of export markets might appropriately be handled through the association, many of the other subsidies should be given more selectively to individual companies. Accordingly, a request to subsidise an exhibition or adver advertising by a machine tool manufacturer who has shown significant export performance and/or can show that it has studied the market and that its machines incorporate the features desired by foreign end users should be favourably received.

11. Participation in Machine Tool Exhibitions

The Indian Government has been subsidising participation in foreign exhibitions by Indian manufacturers, including machine tool producers, through several agencies. The Directorate of Exhibitions in the Ministry of Commerce, the Indian Council of Trade Fairs and Exhibitions, and the Engineering Export Promotion Council are all organisations financed through the Ministry of Commerce, which sponsor and subsidise participation in exhibitions. The STC also organises participation. The Directorate of Exhibitions draws up an annual programme of official Indian participation in trade fairs and of exclusive Indian exhibitions where fairs are not held, and this is implemented by the Directorate of Exhibitions and the ICTFE.

The Directorate of Exhibitions organises exclusive Indian Exhibitions abroad, e.g. in Ceylon (January 1969), Indonesia (May-June 1969), and Singapore (June-July 1969). The Indian Council of Trade Fairs and Exhibitions sponsors Indian participation in foreign trade fairs such as the Baghdad International Trade Fair (October 1968) and the Leipzig, GDR, Spring Fair (March 1969, and for several years in the past). The EEPC sponsors participation at specialised fairs featuring engineering products where there is no official Indian participation by one of the other organisations, e.g. at the International Engineering and Marine Exhibition in London (April-May 1967) and at the International Engineering Exhibition in Sydney, Australia (August 1968). Machine tool producers have participated in exhibitions sponsored by all of these agencies, e.g. HMT, Kirloskar, Cooper and Batliboi participated in the Baghdad International Trade Fair in the ICTFE's Indian pavilion; Mysore Kirloskar showed a capstan lathe at the Leipzig Fair; HMT lathes and radial drilling machines and Mysore Kirloskar machines were shown at the EEPC sponsored pavilion of the Sydney Fair· and HMT's M2V milling machine was exhibited at the EEPC-sponsored stand at the London Fair.

The fee charged to Indian manufacturers for space in India Pavilions arranged by the ICTFE is Rs 300 per sq m, covering space rent, general display and decoration charges and services of pavilion staff. There are rebates of upto 30 percent of the fee if the participant is a member of the ICTFE and the exhibit is sponsored by an export promotion council. The participant pays all freight and handling charges unless it receives special subsidy of this from ICTFE. In the case of EEPC sponsored participation, the Government pays the expenses incurred in India upto the Indian Port and bears the cost of returning the exhibit if it is not sold.

There is widespread dissatisfaction among machine tool producers with how Indian participation in such fairs is handled. One complaint is that there is too much emphasis on fairs in developing countries and Eastern Europe compared to the advanced market economies which these producers see as the market with the greatest potential. Often there is not much prospect of sale of the types of machines exhibited as the manufacturers do not have distributors in the countries where exhibitions are held, and even the machines exhibited are returned unsold. In any case, it is desirable that the manufacturers concentrate on participation in a small number of exhibitions in the priority markets, for example, the U.S., Canada, UK, West Germany, France and Australia.

Another complaint is that often the exhibitions chosen, like Expo 67, are general trade fairs covering the full spectrum of consumer and industrial goods. Most of the visitors are just consumers or tourists with no interest in buying machine tools, and participation is often motivated by political considerations . Many manufacturers feel it is more worthwhile to participate only in fairs that are devoted solely to machine tools.

Not only are the exhibitions chosen not the ones that should receive priority from the point of view of machine tool manufacturers, but some manufacturers report they have participated only because of pressure.

The following list shows the major fairs at which the machine tool industry should participate. In some cases participation is not allowed, but the manufacturers could set up a temporary showroom nearby to attract visitors from the main exhibition.

U.S.A.

1. ASTME Show (Eastern USA), annual
2. WESTEC Show (West Coast, USA), annual
3. National Machine Tool Builders' Association Show (Chicago), every two years, next in 1970

Canada

National Industrial Production and Machine Tool Show (Toronto), every two years, next in 1969.

West Europe

1. International Machine Tool Exhibition (Olympia, London), held in 1968 and 1972
2. European Machine Tool Exhibition, (Rotates between Hanover, Paris, Milan and Brussels), every two years, next in 1969.

The details of these and other exhibitions of interest are given in Appendix 6.

Apart from the choice of exhibitions, it is also felt that the Indian participation is badly organised. Manufacturers report that often they are not given adequate notice of fairs at which there will be Indian participation. Sometimes no more than a month's notice is given and the notices even come in the form of telegrams. Also, on occasion manufacturers have not been given details like electric current supply available at the exhibition with the result that the correct electricals could not be fitted. There are also some complaints that the shipping and forwarding agents chosen to handle arrangements to transport machines to and from the fairs do not take adequate measures to ensure that the machines arrive on schedule and in good condition. Machines have in some instances arrived too late to participate and further, there have been cases where they have been lost.

One reason for the problems with Indian participation in overseas exhibitions was suggested by Mr H. Vollrath, leader of the German export promotion team for Indian engineering products, in an interview with a correspondent of the Financial Express: "It was strange, he felt, that none of the executive staff of the (Engineering Export Promotion) Council had ever attended a trade fair abroad. This precisely was the reason for their inability to assist participants". (Dec 13, 1968, p.8).

Recommendations by IMTMA and EEPC

The IMTMA would like to participate in the major machine tool exhibitions abroad (IMTMA, Letter to Ministry of Commerce, November 20, 1968, Ref. 61/68-69. See Appendix 5 for full letter):

> " It is proposed to participate in important machine tool fairs abroad with a view to projecting India's image as a machine tool producer. Our participation in such fairs would afford an opportunity for the machine tool dealers and users to see for themselves the quality of machine tools available from India .... In the beginning we would like to concentrate nn two or three exhibitions like the European Machine Tool Fair to be held in Paris in 1969, Chicago Machine Tool Fair to be held in the USA in 1970, and Olympia Machine Tool Show in the UK".

According to the EEPC Home Bulletin (November 11, 1968, Vol 1, No. 29, p.749):

> " The Council (EEPC) has recommended to the Directorate of Exhibitions, Ministry of Commerce, inclusion of one of the specialised (U.S.) Tool Expositions in the programme for India's participation in Exhibitions and Fairs overseas during 1969-70. Our Foreign Officer has suggested that Indian Machine Tool Manufacturers should make it a point to participate in some of these specialised shows".

Recommendations

The crucial point that we would like to stress is that in order to get optimum results from investment in exhibitions, only those models which meet the design specifications of foreign customers should be exhibited. Participation in international exhibitions can begin in 1970 with the machines which are ready for export; more extensive Indian participation can be scheduled from 1971 after more manufacturers have taken the necessary steps to make their machines suitable for target markets.

Assuming the companies are willing to cooperate on their participation, it would be best to arrange joint exhibitions since this would facilitate building an image for India as well as the individual companies. A consolidated Indian exhibit would attract more attention and press coverage than separate stalls in different parts of the exhibition. Individual companies would gain by cooperation, since their competition is not with each other but with other established suppliers. However, they may not wish to cooperate or they may wish to participate in the fairs in their distributors' stalls, and in this case individual participation is recommended.

Exhibition Space

The nature of participation recommended in international exhibitions and the costs is illustrated in the example given below. It is to be noted that the list of machines given below is illustrative and not exhaustive.

H.M.T.

RM radial drilling machine
G grinding machine
E2 electrically controlled milling machine

Mysore Kirloskar

Lapaz lathe - 13" swing over bed
Rigiturn lathe - 17" swing over bed

Telco

Column drilling/boring machine - 25 mm and 40 mm capacity.

This would require a minimum total floor space of 1350 square foot (six times 15' x 15').

The minimum total cost of such an exhibit in the USA for a five day fair would be:

1.	Space rental : 1350 sq ft @ $ 6 per sq ft	$ 8,100
2.	Hotel, food, taxi : 9 people (one per company plus one per machine) for 6 days during show plus 3 (one per company) for 5 days prior to show. 69 man-days at $ 30 per day	$ 2,070
3.	International travel : 3 round trip plane tickets India – USA @ $ 1200	$ 3,600
4.	Domestic Travel : 6 round trip plane tickets @ $ 200	$ 1,200
5.	Domestic transport of machine between distributor and fair : 6 machines	$ 1,200
	Minimum Total Expenses :	$ 16,170
	Plus allowance for official entertainment international freight of machines or higher expenses under above headings	$ 3,830
	Realistic Total Expense	$ 20,000

Given the selective nature of the participation, in that it should be limited to companies with machines which meet the design standards of the advanced countries, it is believed that this basic exhibition should be set up at the major machine tools exhibitions in the USA, Canada, UK, Continental Europe, and Australia, which would be an average of five times per year. This would require a total expenditure of foreign exchange of $ 100,000 or Rs 7.5 lakhs. Eventually this expenditure can be borne in part by overseas distributors, but initially distributors cannot be expected to make much of an outlay on promotion, and India will have to bear the expenses in the first years. Later, as more companies participate, the expenditure on exhibitions may be increased.

It is of interest to note that HMT has already rented 960 square feet of exhibit space at a cost of $ 2,674 in the National Industrial Production and Machine Tool Show of Canada to be held June 2-6, 1969 at Toronto.

In order to put the recommendation for Indian participation into perspective, it is useful to consider the exhibition space taken by other foreign manufacturers at the ASTME Show and the Production Show, the major fairs in the USA and Canada. Table 3 in the next page shows the space rented by official foreign organisation at the ASTME Show in 1968 and 1969. At the 1968 WESTEC Show, there were group exhibits by Japan, UK, Australia, Italy and Sweden.

In addition to the group exhibitions, some foreign companies exhibit independently while others exhibit in conjunction with local distributors. At ASTME in 1968, this included companies from Japan, Italy, West Germany, Switzerland, Sweden and Belgium. Czechoslovakia and Poland exhibited machine tool accessories.

Table 3

Foreign Group Participation at ASTME Shows

		1968			1969		
		Space requested Sq ft	Space rented Sq ft	Cost of space rented US $	Space requested Sq ft	Space rented Sq ft	Cost of space rented US $
U.K.	: British Machine Tool Trade Association	15,000	10,710	64,260	20,000	12,000	72,000
Japan	: Japan Machine Tool Trade Association	15,000	10,500	63,000	NA	NA	NA
Italy	: Italian Institute for Foreign Trade	5,000	3,000	18,000	4,000	4,000	24,000
Canada	: Department of Trade & Commerce of the Canadian Government	2,500	1,500	9,000	None	None	None
Spain		None	None	None	10,000	4,000	24,000
France		None	None	None	3,000	2,400	14,400
Denmark		None	None	None	200	200	1,200

NA - Not Available

At the 1969 Production and Machine Tool Show of Canada, there will be eleven group exhibitions as listed in the table below. Except for Austria and Portugal, all of these countries have participated in exhibitions in previous years also. In addition, to the group exhibitions, foreign equipment is being shown independently in the stalls of local distributors. Manufacturers from thirteen countries without group exhibits are participating in this way, including ones from the U.S., Bulgaria, Hungary, Yugoslavia and India (HMT).

Foreign Group Participation at Production and Machine Tool Show of Canada, 1969

	Space rented sq ft	Cost of space rented US $
UK	8,520	23,732
Italy	4,800	13,370
West Germany	3,360	9,359
Sweden	2,640	7,358
Japan	2,400	6,685
Austria	2,400	6,685
Switzerland	1,680	4,680
Ireland	1,440	4,011
France	960	2,674
Poland	840	2,340
Portugal	720	2,006

12. Advertising in Trade Journals

The Indian Government subsidises advertising of Indian products overseas through the export promotion councils, including the EEPC. The EEPC advertises both through its own monthly publication, Indian Engineering Exporter, which frequently includes propaganda articles on the machine tool industry and advertisements by machine tool producers, and by taking advertisements in foreign trade journals. For example, the July 1968 Indian Engineering Exporter was a special issue on the "Machine Tool Industry in India - Its Attainments and Export Potential". The EEPC has also advertised in Machinery and Production Engineering, a leading UK trade journal catering to machine tool users. For example, in the October 30, 1968 issue there is a one-half page ad for the Kirloskar Lapaz lathe issued by Kirloskar Electric in conjunction with the EEPC. The EEPC pays two-third of the cost of publicity it sponsors while the exporter pays the remaining third.

The existing advertising conducted by the EEPC on behalf of machine tools has certain shortcomings. First, the buyers of machine tools constitute too specialised a market for a general approach to promotion of engineering products collectively. The Indian Engineering Exporter would therefore be of little commercial interest to the people who buy machine tools in the advanced countries, and its circulation is certainly negligible among this group readers. Similarly, even when it has taken advertisements in specialised journals, the EEPC has often taken too general an approach. For example, in the December 6, 1967 issue of Machinery and Production Engineering of the UK, there is a half page advertisement as follows:

"More than a hundred engineering items for export ..... from ...... locomotives .... to pins".

Although some of the EEPC's promotion suffers from being too inclusive, this is not always the case. For example, in 1967 Mr Graham Garratt, Associate Editor of Machinery and Production Engineering, paid a visit to India sponsored by the EEPC, and this visit resulted in a series of eleven articles in that journal describing Indian engineering establishments, including machine tool factories that he visited in India (Issues of 26 July - 20 December 1967). Included among these were HMT, Mysore Kirloskar and Cooper. Each received about six pages of detailed coverage, space which would have cost each company over $ 800 at the advertising rates alone. This amounted to $ 9000 in space for the series of articles, not to mention the advantage of presenting the material in the form of feature articles and the future goodwill of the journal.

Another limitation of the Indian Engineering Exporter is that, while the quality of the paper and printing are up to international standards, the articles themselves could be improved. It would be helpful if the EEPC could coordinate with the IMTMA to improve the content, bringing it uptodate and giving better coverage of leading firms like Mysore Kirloskar and Telco.

It is suggested that the IMTMA could prepare additional material on the industry on a regular quarterly basis to send to leading foreign trade journals. These journals might carry such material as free news items, particularly if they coincided with Indian participation in exhibitions and if Indian manufacturers secured the goodwill of the magazines by taking paid advertising.

If Indian manufacturers are to advertise in foreign trade journals, it is important that the advertisements be up to international standards, In promoting conventional, general purpose machine tools, it is not necessary to go to the extremes used in promoting consumer products or ultra-sophisticated machine tools. Black and white advertisements giving a picture of the machine, a few of its major specifications, the address of the distributor, and a brief caption and text are adequate. However, the cartoon-type drawings of machine tools typically used in Indian advertisements do not reach this standard. It would be useful to look through copies of the trade journals in which advertisements are to be inserted to obtain guidance on the layout of the advertisement.

In drawing up a programme for advertising, it is important to select the correct products to be advertised; identify their users and the trade journals which cater to this group of readers; and determine the best timing for advertisements. The best means of ensuring effective results in terms of advertising is to entrust the task to local professional advertising agencies in the export markets, as is done by the Japanese.

(1) Products to be Advertised

India should advertise only products which are suitable for the market and are available for immediate delivery. This means the manufacturer must have export rights, whatever design modifications are necessary should have been carried out, and distributors should have been appointed to handle sales and service. This implies that at present, advertising should be concentrated on products of HMT and Mysore Kirloskar, who have a product range on hand with immediate sales products, possibly with some limited advertising of Telco and others who have developed products which merit display in exhibitions.

(2) Users and Journals

For some time to come, Indian machine tools will be aimed at the user of conventional, general purpose machine tools. The best media for advertising machine tools are the specialised trade journals. The Indian machine tool industry should advertise only in the ones which cater to users of conventional, general purpose machines which it has to offer. A few of the major publications of this type are:

USA : American Machinist; Metalworking News
Canada : Canadian Machinery and Metalworking
UK : Machinery and Production Engineering
Australia : Australian Machinery and Production Engineering
West Germany : Werkstatt und Betriet

There are many other journals which are similar in some respects but often less suitable. For example, in the U.S., Iron Age is one of the major metalworking trade journals. However, it focuses more on equipment for the primary metal industries, heavy metalforming machine tools and sophisticated machines like numerically controlled machining centres. There is very limited coverage of conventional, general purpose machine tools.

There is heavy advertising in the above trade journals by Japanese machine tool manufacturers, and the Japan Machine Tool Trade Association regularly takes several pages in journals like Canadian Machinery and Metalworking on behalf of its members in addition to the advertising done directly by the manufacturers and their distributors.

(3) Schedule of Advertising

Apart from advertising at some regular interval as advised by the professional advertising agencies, Indian machine tools manufacturers should time their advertising to precede and coincide with any trade fairs in which they will participate. All journals run special issues or features for the trade shows.

Annual Advertising Plan

There should be an annual advertising plan with careful selection of media to produce best results. The nature of media planning that will be necessary is illustrated by the budget suggested below for a sample of HMT, Mysore Kirloskar and Telco machines suitable for export. This budget has been given purely as an illustration. Individual manufacturers will have to develop their own media plans on the basis of the machines they intend to export and the target markets and customers they have in mind.

American Machinist (Fortnightly) - U.S.A.

HMT	-	8 pages	@	$ 1240	-	$ 9,920
MK	-	3 pages	@	1240	-	3,720
Telco	-	1 pages	@	1240	-	1,240
						$ 14,880

Metalworking News (Weekly) - USA

HMT	-	8 half pages	@	$ 840	-	$ 6,720
MK	-	3 half pages	@	840	-	2,520
Telco	-	1 half page	@	840	-	840
						$ 10,080

Canadian Machinery & Metalworking (Monthly) - Canada

HMT	-	8 pages	@	$ 411	-	$ 3,288
MK	-	3 pages	@	458	-	1,374
Telco	-	1 page	@	458	-	458
						$ 5,120

Machinery & Production Engineering (Weekly) - U.K.

HMT	- 8 pages	@ $	130	-	$ 1,040
MK	- 3 pages	@	140	-	420
Telco	- 1 page	@	144		144
					$ 1,604

Werkstatt und Betriet (Monthly) - West Germany

HMT	- 8 pages	@ $	314	-	$ 2,512
MK	- 3 pages	@	320	-	960
Telco	- 1 page	@	330	-	330
					$ 3,802

Australian Machinery & Production Engineering (Monthly) - Australia

HMT	- 8 pages	@ $	112	-	$ 896
MK	- 3 pages	@	116	-	348
Telco	- 1 page	@	125	-	125
					$ 1,369

13. Summary of Budget for Market Development

In suggesting an export marketing strategy for Indian machine tools, we have so far discussed the need for, and made recommendation on, the following:

i) Participation in exhibition
ii) Advertising
iii) Visits to India by foreign machine tool distributors.

In addition to the above, the successful development of export markets would also require the following:

(i) Visits of Indian machine tool manufacturers and engineers to priority markets.

It is essential for Indian machine tool manufacturers, particularly the design engineers, to visit end-users in the priority markets to study their needs so that they can determine the adaptations required in the Indian models to make them suitable. Manufacturers should also visit potential distributors. These trips should be intensive, e.g. major firms should send two engineers to the U.S. for two months. Unfortunately there is a tendency for study teams sent by a number of organisations in India to travel to too many places in too short a time.

(ii) Contract market research in priority markets:

There is also need for comprehensive market research in priority markets to obtain detailed information about the target consumers and the potential for Indian machine tools. It is recommended that this market research be contracted to local professional market research agencies in the priority markets who have knowledge and experience of the market.

(iii) Overseas Offices, showrooms and warehouses:

It will also be necessary to set up modest overseas offices, showrooms and warehouses as part of the export strategy that we have recommended, for controlling the marketing operations, organising demonstrations and stocking machines and spare parts respectively.

Table 4 on the next page presents a summary of annual budget for these expenditures in the initial years. It is to be emphasised that the budget of Rs 33.075 lakhs proposed is the minimum required for the purpose of promoting the exports of Indian machine tools. The optimum figure should be in the neighbourhood of Rs 50 lakhs, especially if small manufacturers are to be given required support for exporting their machines. It is estimated that foreign exchange expenditures of the strategy outlined would average $ 400,000 - $ 500,000 per year in the Fouth Plan period. The amount probably would not exceed $ 400,000 annually in 1969/70 and 1970/71 because, for reasons already discussed, it will take some time to get the export drive under way for a number of firms. By the last two years of the Fourth Plan, expenditures would be about $ 500,000 per year.

Within the total of $ 400,000 - $ 500,000 budgeted for market development, the pattern of expenditure will shift over the Fourth Plan. In the initial years a substantial part of the expenditures would be on visits of distributors to India, visits of Indian representatives to foreign markets, and contract market research. Later in the Fourth Plan, these expenditures would decline, releasing about $ 100,000 for additional expenditures on exhibitions, advertising and overseas offices and showrooms. In fact, these latter expenses could increase by more than $ 100,000 since the total expenditure under all headings is budgested at about $ 500,000 for the last two years of the Plan.

In addition to foreign exchange expenditures, there will of course, be rupee costs of the export drive. For example, there are the costs of supporting export marketing personnel, the costs of redesigning machines, the local costs of preparing for advertising and exhibitions, costs of training servicemen etc.

Table 4

Annual Budget (Initial Years) for Export Market Development

	Foreign Exchange Cost ($ '000)	Total Cost in Rupees (Rs lakhs)
Participation in Exhibitions	100	7.500
Advertising	45	3.375
Visits to India by Foreign Machine Tool Distributors *(including Rupee Costs)	21	2.250*
Visits of Indian Machine Tool Manufacturers and Engineers to Foreign Markets	66	4.950
Contract Market Research Abroad	50	3.750
Overseas Offices, Showrooms, Warehouses (including salaries)	150	11.250
	$ 432	Rs 33.075

Apart from the foreign exchange expenditure is the question of subsidy. This report has recommended subsidies of export market development for machine tools from the MDF. It is suggested that against an average expenditure of $ 400,000 to $ 500,000 or Rs 30 to 37.5 lakhs, the Government could give a subsidy of 50% or Rs 15 to 18.25 lakhs per year.

We have emphasised that this subsidy should be granted selectively and would be contingent on fulfilment of certain conditions by machine tool manufacturers, particularly adoption of a clear overall strategy, formation of sound proposals spelled out in detailed operational terms, and progress on market research and product development. With regard to selectivity, we have emphasised that subsidies could be given to a large number of firms in the industry or the IMTMA for certain types of market development, such as market research, trips to overseas markets, visits by potential distributors to India etc. However, we have argued that subsidy of expenditures on exhibitions and advertising should be restricted to the firms with products and distribution systems ready for export, as is the case with HMT and Mysore Kirloskar. Other firms are taking similar steps and should be given assistance in due course when their product line becomes suitable for export.

Initially market development expenditures will be a heavy proportion of sales but they must be regarded as a long term investment which will produce a return in the future. The incidence of costs over the total period of development of export will be economical and, once the break-through has been accomplished, will decline as sales will increase faster than expenditures, which will level off, as is illustrated by the Japanese experience.

The pattern of promotional expenditure in relation to exports should be as follows:

Year	Estimated Exports (In lakhs)	Promotional Expenditures (In lakhs of Rs)	(As % of Sales)
1968-69	150	30.0	20.0
1969-70	250	30.0	12.0
1970-71	350	30.0	8.6
1971-72	450	30.0	6.7
1972-73	550	37.5	6.7
1973-74	750	37.5	5.0
	2,500	195.0	7.8

By 1973-74, Indian machine tools should have secured a sufficient base and sales momentum in export markets to reach a target of Rs 15 crores per annum by the end of 1975-76. Promotional expenditures need not rise proportionately and expenditures of 5% of sales should suffice.

14. Export of Indian Machine Tools

Among Indian machine tool manufacturers, two - HMT and Mysore Kirloskar - have developed exports to the point where they have regular orders coming from a number of distributors abroad. HMT alone accounts for at least half of India's machine tool exports. A number of others have a few distributors abroad and have exported a limited number of machines to them. Sometimes distributors whose major agency for the Indian firm is in another of its products, such as diesel engines, also handle their machine tools. Quite a number have sought orders while on business trips abroad and participated in at least a few foreign exhibitions under sponsorship of the Directorate of Exhibitions, ICTFE, or EEPC, particularly in developing countries and Eastern Europe. A good number have exported at least a few machines under special arrangements - consignment shipments and trial orders by distributors, sales through collaborator, sales arranged through STC, sales under tied credits to Ceylon*, or supply of machines where the actual export was arranged by the buyer, either an expatriate Indian or an Indian company sending the machines abroad as part of a joint venture.

In 1968-69, Indian machine tool exports exceeded US $ 1 million for the first time. In the first eight months of the year alone exports amounted to $ 1.4 million, or more than twice the volume of the corresponding period of 1967-68. Appendix 7 shows the level of Indian machine tools in each year since 1956-57, while Appendix 8 shows the breakdown by country for 1965/66 to 1967/68. Appendix 9 shows the breakdown of exports by products for 1964/65 to 1968/69.

15. Subsidies Given to the Exporter on the Basis of Actual Exports

Machine Tool exports receive the same basic subsidies as other non-traditional exports and higher subsidies than traditional products. The subsidies are the same regardless of whether exports are made for free foreign exchange or on rupee account.

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* The Government of India extended tied loans of Rs 5 crores to Ceylon, and earmarked Rs 80 lakhs for machine tools.

(1) Cash Subsidy: Machine tools receive a cash subsidy of 20% of their FOB value. The rationalisation of this subsidy is that it offsets cost disadvantages which are not specifically taken care of by other subsidies. This includes both costs which reflect the use of resources, such as the high price of inefficiently produced inputs, and costs which do not, such as unrebated taxes. Moreover, it applies both to exports for hard currency and rupees. Hence it is designed only partly as a form of selective devaluation.

There is an extra cash subsidy of 5% on the FOB value of all machine tool exports of firms whose machine tool exports for 1968-69 are at least 10% higher than for 1967-68. In fact, since the great bulk of exports are accounted for by firms which increased their exports by over 10%, the effective cash subsidy was 25% in 1968-69. However, sales made to Ceylon under the tied credit from India, which earmarked Rs 80 lakhs for machine tools, are being given only 15% cash subsidy on the grounds that the tied aid gives sufficient competitive advantage so that producers can recover a higher price on exports to Ceylon than exports elsewhere,* and with the justification that the difference is a service charge to the Indian Government on the credit.

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* However, the reduced rate of subsidy was announced three months after Indian companies had submitted quotations, and thus many companies could not adjust prices to compensate.

Cash subsidies on other engineering products range between 10 and 25 percent. In general, the level is higher where the indigenous value-added content of the product is higher.

(2) Import Replenishment

Machine tools receive an import replenishment of 20% of the F.O.B. value of exports. Although the direct current import content of the machine tools presently exported is well below 20%, for the machine tool industry as a whole direct current import content is about 20%. As a priority industry, the machine tool industry can import its maintenance requirements anyway. However, the import replenishment on machine tool exports can be used by a firm to import inputs for other products it makes which do not have priority status. Also, the firm is freer with respect to the source of its imports and is allowed to use part of the replenishment for imports which would normally be banned but which would contribute to the export effort, like electric typewriters and high quality stationery. Moreover, the import licence may be used for jigs, tools and equipment for packaging, upto a limit of 20% of the value of the licence or one lakh rupees, whichever is less. According to Government regulations, the replenishment allowance can be transferred with certain restrictions. The party to which it is transferred must be a manufacturer producing for export or producing inputs used in export products, and no payment can be made. In practice, at the end of 1968 it was necessary to pay a premium of 35 - 40% of the face value of the replenishment to get one in the market and a firm could get a like amount by selling extra ones, although some firms stated that they did not sell them even when they had extras.

Consequently, assuming a market value of 40% of the value of the replenishment and taking into account the fact that the import content of machine tools that are exportable is typically not more than 10 per cent, the import replenishment of 20% of the F.O.B. value has a cash value of 4% of the F.O.B. value to the exporter.

Import replenishment on other engineering products vary between 5 and 90 percent. They are higher where the import content of production is higher, but since the percentage is based on the import content of total production, with an allowance for waste, rather than expert of a certain item, it will often differ from the import content of exports.

(3) Drawback of Customs and Central Excise Duty:

Machine tools, like other exports, receive a drawback of the full duty and central excise tax paid on the current inputs used directly by the machine tool manufacturer. When the drawback is calculated, an allowance of 5 - 8% of raw materials is made for waste. However, there is no drawback of duty or Central excises on machinery or on inputs into the inputs used by the machine tool industry, and there is no rebate of excise or sales taxes levied by the State or municipalities or of the 3% excise on steel collected by the Central Government for the States. In practice, the major drawbacks include the excise tax on pig iron and steel and on electric motors and duties on imported alloy steels, ball bearings, components etc.

The drawback varies a great deal depending on import content, but machine tool exporters report receiving 2 to 6 percent of the F.O.B. value. The drawback rate is set on a case-by-case basis for each machine tool model after a unit is exported, and one frequent complaint is that it takes a much as a year to get a rate set and to get the first rebate.

(4) Reimbursement of the Difference between Indian and International Prices of Iron and Steel

Machine tools exports like other engineering exports containing iron and steel, receive reimbursement of the difference is the cost of the pig iron and mild steel, including an allowance of about 8% for process wastage, at Indian and international prices. This reimbursement is made by the Joint Plant Committee from its "Engineering Goods Export Assistance Fund" on the recommendation of the EEPC. For the purposes of the calculation, the Indian prices are taken as the control prices and extras set by the Joint Plant Committee, while the international price of pig iron is based on the price at which pig iron has been contracted for export; that of steel is taken from the London Metal Bulletin with Benelux extras. No such drawback is given for alloy steel. Since most machine tools contain primarily foundry pig iron and scrap in the castings, and alloy steel, the benefit of this drawback is derived almost entirely on the basis of the pig iron. The exception would be certain metal-forming machine tools for which the frames are fabricated of mild steel plate. Since foundry grade pig iron is about Rs 350 per ton before excise taxes in India and Rs 250 per ton at international (expert) prices, the drawback is about Rs 100 per ton. As a percentage of F.O.B. value this varies greatly between machine tools because of difference in quality and sophistication. However, it would be of the order of 1 percent of the F.O.B. value for conventional machines.

In summary, the four subsidies listed above had about the following values as of the end of 1968.

		Percent of F.O.B.value
1.	Cash subsidy	25
2.	Import replenishment ..	4
3.	Drawback of duty and central excise	2 - 6
4.	Drawback of price differences of iron and steel	1
	Total ..	32 - 36

This means that for every US dollar earned on experts, the Indian exporter received, directly or indirectly, Rs 9 - Rs 9.50.

Regarding the cash subsidy, the Joint Sub-Committee of the Development Council for Machine Tools and the IMTMA was of the view that the present subsidy of 20% + 5% incentive for exceeding the export target by 10% was not adequate. The Sub-Committee was of the view that "their experience has shown that many of the exporters are incurring loss of 10 to 15% even after allowing for the present levels of cash subsidy. In order to make export of machine tools more attractive, the Sub-Committee suggests that for an initial period of 5 years the cash subsidy should be increased to 25% with 5% additional incentive for exceeding the export target by 10%. Also, irrespective of the fact that the machines are sold on Indian lines of credit or otherwise, the cash subsidy should remain the same as it is not advisable for exporters to have two different prices for exports to the same country."

Income Tax Treatment

Although there was a provision for rebate of income tax on the basis of export earnings from 1962 until devaluation in 1966, there is now no such provision. Moreover, any increased profits resulting from the subsidies mentioned above are taxed. In the case of a firm with a tax rate of 70% covering all overheads on the basis of the home market alone, and covering all variable costs of exports by the F.O.B. price, the Government would recover as much as 70% of the subsidy, so that subsidies of 35% of F.O.B. value would be equivalent to a tax credit of 10.5% of F.O.B. value. On the other hand, especially in the recession, there are firms without any taxable profits even allowing for exports and subsidies, and the Government does not recover any of the subsidy.

Relation of Export and Domestic Prices

A comparison of the listed export and domestic prices of Indian machine tools shows that the bulk of machines are being exported at F.O.B. prices considerably lower than domestic selling prices.

Once the value of subsidies is added to the F.O.B. price there are some cases where the realisation from export would be higher than in the domestic market, but in general the realisation would be lower even before allowing for marketing expenses. Some companies determine the F.O.B. price simply by subtracting export subsidies from the domestic market price, but most companies subtract more. It is not surprising that realizations from export should be less than the home market, because markups in India have been high because of the absence of competition.

There are a large number of cases where F.O.B. prices are set at 60-70% of the domestic selling price, with some as low as 50%. Assuming subsidies of 35% of the F.O.B. value, an export price equal to 50% of the domestic price would give an export relisation of 67.5% of domestic realisation; 60% would give 81%; 70% would give 94.5%; and 74% would give 100%.

It should be noted that marketing expenses are greater for export than for sales in the domestic market, and this must also be deducted from the selling prices before it is possible to compare the net realisation from export and sales in the domestic market.

16. Export Subsidies in the Advanced Countries

16.1 Fiscal Incentives for Exports

In the advanced countries, which have achieved the greatest success in export of machine tools, Government incentives in the form of cash subsidies, tax rebates, concessional prices of inputs, and special import privileges play a relatively minor role. Success in exporting depends not on subsidies but on the development of a machine tool industry with a competitive cost structure and low-cost sources of supply. This is achieved by quality management and has been aided by Government policies which give relatively free access to imported inputs and do not shelter the industry from the discipline of competition with imports. These countries have sacrificed the security of a protected home market for the benefits of competition, and with it lower cost machine tools for their domestic engineering industries as well as the ability to compete in lucrative export markets. On a world-wide basis, barriers to trade in machine tools are low and the machine tool industry is highly export oriented, exporting one-fourth of its production.

The one form of fiscal incentive which is common is the rebate of tariffs and sales taxes on inputs used in production of exports. It should be noted that cash subsidies and rebate of profit taxes is prohibited by the GATT.

16.2 Export Promotion

While the governments of advanced countries give only limited fiscal incentives to exports, they actively promote exports in other ways. These measures are designed primarily to cover overhead expenses in exporting, to reduce risks, and to assure that firms have access to adequate credit facilities.

First, they have highly developed government-financed facilities for market research. Market research is carried out not simply by ad hoc sales-cum-study teams spending a few days in a foreign country but on a continuing basis by permanent commercially trained representatives stationed in the foreign markets.

Second, they undertake sales promotion efforts, with heavy reliance on government supported participation in trade exhibitions and often government-sponsored showrooms.

Third, some of these countries provide financial assistance and insurance to encourage firms to develop foreign markets, for example, by deferment of taxes on income invested in foreign market research, sales promotion, or establishment of overseas distribution, with provision for waiver of the tax liability altogether if the venture is not successful.

Finally, export credit is often provided by the government, sometimes at subsidised rates, and availability of export insurance against political and other non-commercial risks is universal.

17. Difficulties Encountered by Exporters

17.1 Trade Barriers

As a rule, barriers imposed by foreign governments on imports of machine tools are not a major factor on Indian exports. In the OECD countries, tariffs are about 5 to 15% and they are being further reduced as the Kennedy Round concessions are implemented. In the developing countries, machine tool and other capital goods imports are generally subject to much more liberal controls than consumer goods because of their importance in economic development.

There are, however, a few exceptions:

(a) Australia imposes a tariff rate of 42.5% on machine tools of types produced in Australia (e.g. centre lathes) and 7.5% on types not produced in Australia (e.g. turret lathes) but allows U.K. machine tools preferential tariffs of 22½% and free respectively. This puts Indian producers at a great disadvantage.

(b) A number of countries with foreign exchange difficulties have imposed import licensing on machine tools, and in some cases import licenses are granted only for goods from countries which sign bilateral agreements or which provide aid. This is true primarily of a few developing countries, but the situation in New Zealand is similar.

(c) A few developing countries have developed a machine tool industry and protect it in the same way India protects its own, and the number of such countries will increase. As a result, there is little prospect of selling conventional, general purpose machine tools in certain industrialising countries like Brazil and Mexico.

(d) The U.K., because of chronic balance of payments difficulties, from time to time imposes surcharges on imports or requires a deposit against imports. At present (January 1969) there is a 50% import deposit required, and one machine tool exporter has reported that this has made it impossible to send shipments to U.K. distributors on consignment. In the previous year, at least 50% of its shipments to the U.K. were on six-month consignment to the distributor. There is a danger of similar restrictions in France which also has balance of payments problems.

17.2 Shipping

Machine tool exporters report a number of difficulties regarding shipping:

(a) Freight Rates: The freight rate on machine tools to Europe or North America is a high percentage of the F.O.B. value of the machine, about 5 to 20% for the major exporters. Closure of Suez has meant a 15% surcharge on freight. It is also reported that freight rates from India are higher than rates for the same route in the other direction or for other suppliers at a longer distance to the same destination. It is understood that the Ministry of Commerce has been considering payment of subsidy to exporters on account of high shipping freight, particularly where Indian goods are competitive on an F.O.B. basis but not C.I.F. because of the higher freight charges. (See EEPC Circular No.OS/166/68-69 dated 3rd September, 1968).

The difficulties caused by disparity in freight rates and infrequent services are particularly applicable in the U.S. market in relation to India's major competitors - Japan, Poland, Italy and Spain. The Sub-Committee of the Development Council for Machine Tools and the Indian Machine Tool Manufacturers' Association feel that "The only way to overcome this trade disparity is that Indian manufacturers should only be asked to bear the freight that is equivalent to the freight paid by the Japanese manufacturers from Kobe to San Francisco or the freight paid for shipment from Spanish ports in New York and any freight paid over and above this limit should be given as a subsidy for a period of five years. After that period, it is anticipated that Indian machine tool manufacturers would be in a position to build up a sufficiently high reputation in world markets to enable them to demand better prices for their products and absorb the higher freight costs."

(b) Frequency of Shipping and Availability of Space: Exporters report that often their machines sit at the Indian port for 2 weeks to 3 months waiting for shipping space and frequently do not get put on the first ship. This compounds the difficulties in competing from India on delivery with suppliers closer to the market and with more frequent sailings. It may lead to default of delivery contracts and demurrage charges, and it increases the danger of rust and corrosion.

(c) Shipping Agents: There are complaints that some shipping agents do not make proper arrangements to assure shipping according to schedule. There are reports of machines that arrived abroad too late to participate in exhibits for which they are sent and of machines which have been sent to the wrong destination or have been lost.

(d) Breakage: There have been some difficulties with breakage, notably in the case of a large shipment of lathes to the USA. However, this problem is due not just to the handling of the machines but to failure to pack them properly. One difficulty in packing adequately is the expense, which is a high percentage of value on a machine tool with F.O.B. price of $ 1,000. Another problem has been lack of experience in export packing, plus difficulties in getting some of the required materials, such as high quality packing wood and rust preventives of the types available to competitors abroad.

17.3 Delivery

One important disadvantage of Indian producers in competing in the advanced countries of North America and Europe is on delivery. This is one factor that makes it impossible for India to export non-standard machine tool models to the advanced countries of the West. The disadvantage of the Indian producers stems from:

(a) Longer shipping time compounded by delays in getting shipping space. Thus, it takes a minimum of three months and as much as six to get a machine tool to the U.S.

(b) The need to import certain components such as electricals required by the customer and not available from Indian suppliers, which can be done only against actual order and after proving it cannot be obtained in India. This means addition of the delays of licensing and time of shipping to the usual delivery period of the supplier. Thus, one manufacturer estimated that upon receipt of an order for a machine tool from Canada with Canadian electricals, it would take two months to get an import license, two more months between order and shipment from Canada, and three more months for the part to arrive in India.

Proposed ways to overcome the delivery problem are:

(a) Standardisation of Models and Stocking in India and Abroad: The strategy being followed by Mysore Kirloskar is to concentrate their lathe exports on two basic models and to produce these on a continuing basis for export. At any given time there would be some under production, some finished models available for shipping, and a number of shipment in the pipeline to the market.

(b) Assembly abroad: HMT has recently proposed establishment of an assembly operation in Europe which could stock parts, components, and sub-assemblies imported from India and assemble machines to the requirements of users in North America and Europe.

As a matter of fact, HMT is strongly of the view that unless the facility of assembly abroad is given, it will not be possible for this firm to achieve the export targets projected in this report. In the case of HMT, the number and types of machines planned for export are as many as sixteen, with further permutations and combinations with regard to variants, accessories and colour shades. In the context of delivery times from India being as long as ten months because of shipping delays, it would be difficult to keep all the machines with their required variants, accessories etc, in stock with agents abroad. The only solution is to have assembly shops in Europe and America to ensure prompt delivery to local customers.

Mysore Kirloskar have also expressed the view that because of the long delivery period for goods to reach destinations in export markets, they will require the facility of warehouses abroad if they are to meet the targets set. The Joint Sub-Committee of the Development Council for machine tools and IMTMA is of the view that Government should subsidise warehouse expenses to the extent of 75% of the expenses incurred for a period of at least five years.

17.4 Credit and Other Problems

Although it is usually not necessary for suppliers to provide credit to U.S. importers of machine tools, a new exporter seeking to break into a market, or an exporter working through a distribution with limited resources, may be required to provide credit.

Recently, the Government of India has been increasing the availability of export credit, particularly for capital goods. It is now possible to send machines on consignment for six months. The need for even further credit resources or more liberal permission for consignment export is suggested by the following news article :

"HOW HMT LOSES FOREIGN ORDERS"

> WASHINGTON, March 11 - A U.S. firm which had hoped to build up a business in Hindustan Machine Tools products has been forced to cancel its orders because of lack of financing of the kind usually arranged by the Japanese or Germans in similar circumstances, according to proprietor of the firm.
>
> A year ago, he said, he spoke to representatives of the company and hoped to get rupee credit to purchase the machines and then remit the dollars after the machines were sold here. When he wrote to Indiaasking for shipment, the company wanted a letter of credit which he could not get from a bank. He was then forced to back out.
>
> The firm claims that if it had dealt with a Japanese company trying to crash into the American market, it would have got an advance in yen and the Japanese company would have collected dollars later, getting a good 12 to 15 per cent return.

> Trade sources did not want to reach any conclusions on the basis of this one case but they noted that the reason why the U.S. was able to sell its manufactures in some instances even when prices were not competitive was the excellent credit arrangements.
>
> If India was to break into a field hitherto monopolished by others, it would have to do some unconventional things. (Financial Express, March 12, 1969, p.1)

(a) Post-Shipment Credit

The present post-shipment credit arrangement is only up to 180 days. This period is not adequate, especially because of long shipping periods. In the circumstances, it would be advisable to make post-shipment credit available for a minimum period of 360 days. The possibility of reducing the rate of interest charged at 6% to 4% on post-shipment credit may also be considered in the interests of promoting export.

(b) Export under GRI

Exporters are obliged to get back payment within six months for exports under GRI. This period is inadequate and extension to twelve months should be considered.

(c) Spare parts

It is imperative to keep stocks of spares with agents abroad for quick delivery to customers. Under present RBI regulations, payments for such spares have to be realised within 180 days from the date of shipment. In the interests of ensuring prompt and effective after-sales service to customers, big exporters necessarily have to hold large quantities of spare parts with their agents on which payment is only possible when sales are effected, which cannot be predicted with any degree of certainty. In the circumstances, exporters should have the facility of keeping spares indefinitely with agents. Further, under present regulations, RBI permission has to be obtained before effecting shipment of spares of a value of more than Rs 270. The need to obtain RBI permission leads to considerable delay before spares can be shipped which causes customer dissatisfaction and loss of sales. As machine tools are of a very high unit value, the permissible limit of Rs 270 is unrealistically low. The machine tool industry should have the facility to air freight spare parts during the guarantee period irrespective of the value according to the needs of customers and without having to undergo the present time-consuming formalities.

(d) Aid Loans to Foreign Countries

In aid loans to foreign countries, Indian suppliers are not permitted to remit commission to their foreign dealers. A formula will have to be found which will enable Indian exporters to compensate their foreign dealers by payment of commission or, at least, by permission to import goods from India equivalent in value.

(e) Turn-key Projects

India is embarking on an increasing number of joint ventures abroad. As capital participation by Indian companies is in the form of machinery being sent from here, such joint ventures are an important instrument of exporting machine tools. The Government of India does not treat the export of machine tools for joint ventures at par with other exports. As such, cash subsidy is not allowed. This often makes Indian machine tools un-competitive with the result that foreign partners object to installation of Indian machine tools. It is, therefore, necessary that cash subsidy is also given for machine tools exported under joint venture agreements.

(f) Rate Contract

A facility that would help Indian machine tool manufacturers to export would be automatic eligibility for rate contracts. It is the view of the Sub-Committee of the Development Council for Machine Tools and IMTMA that unless there is a large home market it is impossible to manufacture a product sufficiently low in price to attract foreign customers. The fact that the manufacturers are able to build up export markets speaks for their quality and D.G.S. & D. should find no difficulty in putting them on the rate contract."

(g) Export of Electrical Equipment to Canada

There are difficulties in exporting to Canada, a potentially rich market, because of the insistence by the Canadian Government on obtaining the approval of the Canadian Standards Association of electrical equipment. The C.S.A. has suggested sending a representative periodically to India to visit the factories concerned and inspect the manufacturing process involved.

It is recommended that the Government of India give permission and monetary help to manufacturers to invite C.S.A. representatives to carry out the necessary periodic inspection. The Joint Sub-Committee of the Development Council for Machine Tools and the IMTMA is of the view that the potential of the Canadian export market justifies Government subsidisation of the inspection trips to India of C.S.A. representative to the extent of 50%. The balance 50%, in their view should be jointly borne by the Electrical & Machine Tool Manufacturers sponsoring the visit.

17.5 Distributors

One of the key requirements for success in export is obtaining good distributors to handle sales and service. The machine tool producers which have been most active in export have reported serious problems in getting good established distributors to represent them, although they have been able to get such distributors in some cases. Where they could not get such distributors, they have sometimes settled for distributors without the technical and financial resources, business contacts, and reputation which contribute substantially to success. Unfortunately, th this alternative has not worked well in a number of cases and little progress was made in exporting until their contracts expired and they could be replaced.

These difficulties in getting distributors stem from:

a) Many distributors handle products of only one country, like Japan or U.K., and simply are not interest in adding other countries.

b) Many other distributors handle lines from various countries, but they have a full range of products and cannot handle additional lines, which would compete with the ones they represent.

c) Nevertheless, there are still many others which would take on a new line either immediately or as soon as an existing distribution contract ended, if it looked more profitable than the alternatives. In general, handling Indian machine tools is not very attractive because of the risks. Since India does not have a reputation as a supplier of engineering goods, the distributor has to invest time and money to build a reputation for the Indian product. This requires tying up financial resources. The distributor also runs the risk that he may not succeed or, that if he does succeed, the Indian company might drop him in favour of direct distribution or another distributor offering a more attractive deal.

d) There have been cases where a distributor willing to handle Indian machine tools was sent a low quality shipment the first time and hence lost interest. We found such a distributor in Kenya, one of the largest British importing firms in Nairobi.

e) Finally, there are some distributors who have suggested they would be willing to handle selected Indian machines in the U.S., but they would not sell them under the Indian brand name. Although some Indian companies are willing to sell this way, HMT has not been willing to do so.

17.6 Exporting to Eastern Europe

Several Indian machine tool manufacturers have reported the same difficulties in exporting to East Europe. The machines are sold, generally through the STC (which charges a commission of 2%), to the state trading agencies of the East European countries, and after that the manufacturer receives no feedback. They cannot learn who the ultimate users are or whether they have any complaints about the machines. The machines are sold with a supply of spare wearing parts, sufficient for about 2 years, but the manufacturer has no way to assure that adequate service is provided. The fear to most manufacturers is that customers may be dissatisfied with the machines on account of lack of service and that this will reduce the possibilities for repeat orders and building up a permanent market. Beyond this, Indian manufacturers are not allowed to visit end users to learn about their requirements and the changes they would need in Indian specifications or to promote sales.

Under these circumstances, one recommendation is that Indian machine tool manufacturers make sure that machines sold to East Europe have very complete service manuals in the local language to enable users to arrange servicing. A second recommendation is that the Indian government and STC make every effort to get permission for Indian machine tool manufacturers to visit end users in East Europe.

Apart from this, one important issue is how export of machine tools to East Europe can be promoted. A number of Indian machine tool manufacturers have argued that in negotiating bilateral trade agreements, the Indian government should use the necessary pressure to secure agreement that the other party will import a certain amount of Indian machine tools. Some have suggested that Indian imports of machine tools or other products from Eastern Europe be conditional on their purchase of a certain amount of Indian machine tools.

There is a difference of opinion over whether participation in exhibits in Eastern Europe contributes to exports of Indian machine tools.

Two manufacturers who have shown machines in East Europe argue that imports are not determined by users anyway, so it is not worthwhile to try to persuade them to request Indian machines. On the other hand, another manufacturer who has also participated claims that exhibitions do help, and in fact have led to significant enquiries. Although purchases are made through State agencies, these are said to be responsive to the procurement requests from users.

Of course, the decision on promotion in East Europe depends not only on the volume of exports but the gains from trade with East Europe. It is interesting that while the Government places a premium on hard currency in its foreign exchange allocation policy, the same subsidies are applied to exports to hard currency and rupee payment areas. In particular, they get the same cash subsidy. According to a number of import houses in India, East European countries increase their export prices by about 20% when selling under bilateral non-convertible currency agreements, and this must be taken into account when assessing the gains from export. Similarly, users complain of the low quality of machinery imported from several of the East European countries under these agreements.

There are a number of West European and U.S. designed machines available in India on rupee payment. Since it would require hard currency for East European countries to get these from elsewhere, there might be interest in getting some of these from India. This would apply chiefly to the most advanced general purpose products in India like automatic and copying lathes, vertical turret lathes, cylindrical grinders, gear hobbers, etc. Of course, export of some of these is restricted by collaboration agreements, but in at least one case a machine tool manufacturer in India recently received permission from the collaborator to export to East Europe.

To quote from one machine tool manufacturer: "Every time we visit (the Eastern European) capitals we have been told, after long discussions, that their delegations will shortly leave for India to ascertain what they can buy from us. Such delegations have come and gone. We have the personal experience that these are only make believe efforts and they will not buy one machine tool and equipment so long as they can avoid (it) .... Some of them have even frankly told us that if they must buy, they would prefer to buy from the West European and American sources so that they can get the most modern equipment .... It is extremely difficult to strike a deal unless there is some kind of government to government pressure."

17.7 Government Export Infrastructure

One problem facing the Indian exporter is that the Government's export infrastructure is weak, reflecting the long period during which it was neglected. First, there are many organisations operating abroad independently. This incluses the consulates, the STC and trade centres, and the EEPC. Second, these organizations do not provide the types of assistance needed. They do not provide a regular flow of commercial information, handle special requests from exporters, or handle complaints from importers with the efficiency of Government organizations of competing suppliers.

What is needed is partly a substantial increase in resources in this area. Equally important, the people sent abroad should have the necessary technical and commercial training.

Another useful development would be a division of the EEPC, with a special wing for capital goods. This is necessary to separate market research and promotion of capital goods from consumer goods.

17.8 Red Tape

This report has not dwelled on complaints that delays and red tape arising out of the Government's system of control over investment, foreign exchange, imports and exports impose a serious handicap on Indian exporters. However, it would be a serious omission to ignore such complaints.

There are complaints that, even though permission is finally granted, there is a vast amount of delay, bother, and expense (paper work, trips to Delhi etc) involved in securing approvals for expenditure of foreign exchange related to export, including import of inputs, trips abroad, sales promotion, etc.

There are similar delays and bother in getting rates of subsidy set and sometimes in securing payment. Different companies reported delays of a year on both setting and payment of subsidies, although generally payment is made within 1 - 2 months. However, generally it is the companies which are new to export which have problems of this type; the major machine tool exporters had no complaints on this. The government officials in charge often say the delays are caused by failure of firms to file their applications correctly. The firms argue that the procedures are so complex and so often changed that it is not their fault if not everything is done correctly. Certainly a simplification of procedure and perhaps centralization of administration and payment of subsidies would be beneficial. One suggestion involves certification of subsidy vouchers by the customs authorities at the time of export, and authorization by the government for banks to make payment of the subsidy against these vouchers when the overseas buyers make payment for the shipments in foreign exchange.

There are also delays in approval of collaboration agreements in India and Indian participation in joint ventures abroad.

18. History of the Indian Machine Tool Industry

A brief history of the machine tool industry in India would contribute to an understanding of the present status of the industry. The earliest recorded production of machine tools in India was in 1890, when some factory and workshop owners in northern India manufactured, mainly for their own use, machine tools such as deep gap cone pulley lathes and deep throat drilling machines. These machines were used for the manufacture of parts of simple machines like chaff cutters, cane crushers, and oil expellers. World War I induced a number of small workshops to manufacture machine tools for making shells.

In the latter 1930's a few larger engineering firms began to manufacture general purpose machine tools. In 1937, Cooper began production of machine tools with cone-pulley lathes and pillar-type drilling machines. In 1938 it introduced a shaping machine. At this time Kirloskar Brothers began development work on centre lathes, and the first was produced in 1938. However, till World War II only 100 machine tools were manufactured annually in India. The reasons were that there was little metalworking production in India and imported machine tools were freely available. The major users, the railroads and the larger engineering firms, were mostly foreign owned and preferred imported machine tools.

World War II provided the first major impetus to the development of the machine tool industry. Indian industry expanded capacity to manufacture defence equipment and products which could no longer be imported. The demand for machine tools increased greatly while imports became scarce, especially after 1940. Early in 1941, the Government passed the Machine Tool Control Order and appointed a Machine Tool Controller to regulate imports, to make a survey of the capacity available for machine tool manufacture, to improve the quality of Indian machine tools, and to procure the best quality of machine tools for the armed forces, ordnance factories, and war industries. Industrial licensing and a system of grading machine tools based on Dr. Schlesinger's standards were introduced.

During the six years of World War II, nearly 20,000 machine tools were built in India, valued at about Rs. 6 crores. In 1939-45, Cooper produced capstan lathes with technical assistance from Herbert in the U.K. (After 1947, Cooper ceased production of lathes, capstan lathes, and drilling machines and concentrated on shaping, slotting, and planing machines.) In 1941, Mysore Kirloskar was established to produce machine tools, and Kirloskar Brothers' machine tool activities were shifted there. During World War II eleven firms were rated grade I.

After the war, foreign machine tools were again freely available and the demand for Indian machine tools declined. Production of Indian machine tools declined and reached a low of Rs 0.29 crores in 1950, compared to a peak of Rs 1.12 crores in 1945.

Early in 1945, the Government set up a number of industrial panels, one of which was to prepare a comprehensive plan for the development of the machine tool industry. In 1947, the manufacturers of machine tools applied to the Government for protection and assistance. The case was referred to the Tariff Board, which recommended protection.

After Independence, and particularly after the early 1950's, the Government formulated programmes for industrial development with priority to the capital goods industries, including machine tools. This has been implemented by industrial licensing, control of imports and foreign exchange, and government investment, which led to a substantial expansion of capacity in the private and public sectors in the Second and Third Plan periods.

At the beginning of the First Plan there were 14 manufacturers of graded machine tools, all in the private sector, with an annual capacity of 3,000 machine tools. Early in the First Plan period, the Government decided to set up a machine tool factory in the public sector. The reason then given was that there was a large demand for sophisticated precision machine tools which were not manufactured by existing firms. Assurance was given to the industry that the government-owned units would manufacture only sophisticated high precision machine tools and would not compete in the range of less expensive machine tools produced in the private sector.

The first government-owned unit, Hindustan Machine Tools in Bangalore, went into production in 1956 with a planned capacity of 400 machine tools per year to be achieved in 1960-61. Although originally HMT was to produce just one model of lathe, it soon diversified into a wide range of machine tools, and in 1960-61 by working two-shifts it produced 1002 machine tools of several different types. HMT has since set up one additional unit in Bangalore (1961) and one each in Pinjore (1963), Kalamassery (1964), and Hyderabad (1965). Each has a planned capacity of 1,000 machine tools per annum, and HMT now accounts for nearly half of the capacity and production in the industry.

In 1956, the government set up the Machine Tool Committee, whose major recommendation was for rationalisation of machine tool manufacture, with each Grade I machine tool manufacturer to be permitted to manufacture only types and sizes of machine tools assigned to it. A Development Council for Machine Tools was set up by the Government in 1958. It assessed the demand and recommended the type of machine tools to be manufactured in India. Implementation of the recommendations of the Committee and Development Council gave each company a monopoly in types of machine tools assigned to it for manufacture.

By the latter 1950's, the demand for machine tools had risen substantially because of the growth of industry in India. Because of declining foreign exchange resources, the Government increased restrictions on imports. The Government accepted the recommendation of the Development Council in 1960 to relax the licensing policy to encourage expansion of machine tool production capacity, and a number of licenses were issued to private sector units for manufacture of machine tools.

The development of the Indian machine tool industry has depended heavily on foreign technical collaboration to supply designs and production know-how. There is foreign capital participation in Bharat Fritz Werner, Ex-Cell-O India, and Traub India.

The emergencies of 1962 and 1965 led to special emphasis on increasing production and capacity in the machine tool industry, and by increasing the home market they reduced any incentive to think of export.

19. Indian Machine Tool Consumption, Production, and Imports

Table 5 on p. 141 gives statistics for annual Indian production and imports of machine tools from 1951 to 1967. Production data is for the organized sector only. Since exports were negligible by comparison, production plus imports gives apparent consumption. Until 1966 apparent consumption is an accurate measure of actual purchases, but recently accumulation of stocks means that actual purchases have been somewhat less than apparent consumption. Since the data are all in current prices, they over-estimate the relative increase in production and imports, and since the rupee was overvalued prior to devaluation in 1966, the rupee value of imports is understated while the relative share of production in apparent consumption is overstated.

Production

From the brief history of the industry already given, it can be seen that despite a beginning before World War II, it was the War which gave the initial impetus to the development of the organized manufacturers. Moreover, the development of the industry gathered momentum only during the period beginning with the Second Plan. Production of machine tools was only a little over Rs 1 crore in 1956 but increased to almost Rs 26 crores in 1966. After 15 years of steady growth, in 1967 production dropped sharply to Rs 216 million, reflecting the decrease in demand for machine tools brought about by the recession which affected industry in general and the engineering industries in particular. From the beginning of 1966 the growth rate of Indian industry declined. This recession continued in 1968 and into 1969.

Table 5 - Machine Tools Production and Imports, 1951-67

	Production		Imports		Total	
	Quantity Nos	Value Rs mil	Quantity Nos	Value Rs mil	Quantity Nos	Value Rs mil
1951	N.A.	4.7	N.A.	25.0	N.A.	29.7
1952	N.A.	4.4	N.A.	22.1	N.A.	26.5
1953	N.A.	4.4	N.A.	31.3	N.A.	35.7
1954	N.A.	5.0	N.A.	38.5	N.A.	43.5
1955	2,003	7.4	4,485	52.9	6,488	60.3
Total (51-55)	N.A.	25.9	N.A.	169.8	N.A.	195.7
1956	2,943	12.0	7,352	83.7	10,295	95.7
1957	3,015	25.1	15,339	113.2	18,354	138.3
1958	3,888	37.6	11,953	122.1	15,841	159.7
1959	4,071	43.9	9,072	116.1	13,143	160.0
1960	5,332	61.8	8,225	132.1	13,557	193.9
Total (56-60)	19,249	180.4	51,941	567.1	71,190	747.6
1961	8,511	77.6	11,920	178.9	20,431	256.5
1962	10,293	108.8	10,706	189.5	20,999	298.3
1963	11,058	154.4	10,399	315.1	21,457	469.5
1964	13,370	189.0	7,650	335.3	21,020	524.3
1965	15,423	222.6	9,642	323.2	25,065	545.8
Total (61-65)	58,655	752.4	50,317	1,342.0	108,972	2,094.4
1966	14,931	257.8	7,409	410.0 (356.3)(1)	22,340	668.1
1967	12,330	215.8	6,311	364.3 (231.3)(1)	18,641	580.1

Note: Figures for production are for the organized sector only. Figure in parenthesis indicate equivalent pre-devaluation value.

Source: (1) Production figures obtained from Directorate General of Technical Development.

(2) Import figures compiled from Monthly Statistics of the Foreign Trade of India.

In the Third Plan the Planning Commission set targets for machine tool capacity and production in the organized sector of Rs 30 crores per year by 1965-66 and Rs 100 crores per year by 1970-71, the end of the Fourth Plan according to the original schedule. The first target was not achieved and the latter was dropped because of the recession.

Apart from the increase in the value of production of machine tools, there was a substantial improvement in quality and diversification of types of machines produced. Appendix 10 gives data for production and imports of machine tools by type for 1961-1965 while Appendix 11 gives data for 1966 and 1967.

Imports

Although production increased greatly in the Second and Third Plans and accounted for an increasing percentage of apparent consumption, the value of imports also increased rapidly with the expansion of the engineering industries. From a total of Rs 17 crores in the First Plan period, import of machine tools increased to Rs 57 crores in the Second Plan and Rs 134 crores in the Third Plan. In 1967 imports still accounted for 63 percent of apparent consumption by value.

While the value of imports has increased considerably, except for a drop in 1967, the number of machine tools imported has fallen from 15,000 in 1957 to a little over 6,000 in 1967. This reflects a substantial rise in the average value of imports, which has come about because of demand for more sophisticated and larger machines in India and indigenous production of the smaller ones previously imported. The table below shows the average price of imported machine tools.

Average Price of Imported Machine Tools

Year		Average price Rs/machine
1956	...	12,000
1957	...	7,400
1958	...	10,200
1959	...	13,000
1960	...	16,100
1961	...	15,000
1962	...	17,700
1963	...	30,300
1964	...	44,550
1965	...	33,260
1967	...	55,300
1968	...	57,600

Indian import regulations do not permit import of types and sizes of machine tools that are produced in India. Imported machines are therefore primarily special purpose, high production, sophisticated, or heavy duty machines not produced in India. This is reflected in the average price of imports, which was Rs 57,600 in 1967, compared to Rs 17,500 for Indian machine tools produced in the organized sector.

20. Manufacturers of Machine Tools and Products

The machine tool industry consists of firms ranging from small workshops to HMT producing about half the output of the entire industry. These can be divided into the organized sector and the small scale sector. The organized sector comprises firms licensed to manufacture machine tools under the Industries (Development and Regulation) Act of 1951 and borne on the list of approved manufacturers of the Directorate General of Technical Development. The list of machine tool manufacturers in actual operation in the organized sector is given in Appendix 12, along with their products. This list includes four firms in the public sector and sixty-nine in the private sector.

In order to give an idea of geographical and size distribution of units, units in the organized sector were classified as large, medium, or small on the basis of whether their annual production capacity for machine tools is over Rs 35 lakhs, Rs 15 - 35 lakhs, or less than Rs 15 lakhs. To make the geographical distribution more meaningful, the four different locations of HMT's plants are indicated separately. The two most important centres of the organized sector of the machine tool industry are in Maharashtra and Mysore states, but a number of important units are located outside these areas.

Geographical and Size Distribution of Machine Tool Manufacturing Firms in the Organized Sector

State	Public Sector			Private Sector			Total No. of Firms
	Large	Medium	Small	Large	Medium	Small	
Andhra Pradesh	2	-	-	-	1	-	3
Bihar	1	-	-	-	-	-	1
Delhi	-	1	-	-	1	2	4
Gujarat	-	-	-	-	1	3	4
Haryana	1	-	-	-	1	2	4
Kerala	1	-	-	-	-	-	1
Madras	-	-	-	1	1	4	6
Maharashtra	-	-	-	8	3	9	20
Mysore	1	-	-	4	-	1	6
Punjab	-	-	-	1	3	11	15
Uttar Pradesh	-	-	-	-	-	1	1
West Bengal	-	-	-	3	1	7	11
TOTAL	6	1	-	17	12	40	76

Most of the machine tool manufacturers in the organized sector are producing general purpose machine tools of conventional types in the light to medium-heavy range. A few produce heavy, high production, or special purpose machines and machines with sophisticated controls. Appendix 13 shows the major type and size ranges for each type produced. Appendix 12 lists the manufacturers and the machines they produce. Appendix 14 gives a table with the manufacturers and type of machine, and shows whether the design was secured by foreign collaboration or was indigenously developed.

Apart from the organized sector of the machine tool industry, there are several hundred firms in the small scale sector that manufacture machine tools. J.H. Shah, 1968-69 President of the Indian Machine Tool Manufacturers Association, recently estimated that there were 1000 small scale units producing machine tools worth about Rs 4 crores annually, that is, an average of Rs 40,000 each and a total production about the same as Mysore Kirloskar, the largest unit in the private sector. The greatest concentration of these firms is in the Punjab, near Ludhiana and Batala. A number of these firms make many other items in addition to machine tools, e.g., woodworking machinery or agricultural implements.

An assessment of the production capacity of the small scale sector presents a major problem. The basic data on the number of units, their installed capacities, their production in physical and/or value terms, are not available.

Although some small scale units produce graded machine tools and even have foreign collaboration, most small scale units manufacture ungraded machine tools. A large percentage of these machines are lathes and drilling machines. Virtually all are simple, small machine tools, and the main users are other small scale manufacturers and repair shops. With a few exceptions, the machines produced are of obsolete and inefficient design. They are made from low quality materials and components, workmanship is of low standard, and tolerances are not reliable. From the fact that there is demand for such machines in India one can infer that there would be demand in other developing countries. However, it must be remembered that in many of them competition with other suppliers, both local and foreign, is greater than in India. In view of the problems of marketing such as finding distributors and arranging for service and spare parts, and the danger of injuring India's reputation as a supplier of engineering goods by exporting low quality products, it is concluded that the export potential is very small for the machine tools of the small scale sector as a whole. However, there are a few exceptions where the machines produced are of more acceptable quality, and a few units have exported a small number of machines. In fact, in at least one case a machine was sent to Western Europe.

21. The Industrial Environment of India

In assessing the export potential of the engineering industries, including machine tools, it is important to understand the differences in the industrial environment in India and the advanced countries with which India must compete. The principal differences which affect India's competitive position are:

(1) Rudimentary Supplier Networks

In all developing countries, including the most industrialised like India, the network of ancillary suppliers and subcontracting shops in relatively rudimentary, and the quality of many of the products is low.

(2) Restriction on Import of Inputs

In an attempt to encourage indigenous development of a very wide range of industries and save foreign exchange, India banned imports of materials, components, and machinery available domestically, regardless of the cost and quality of the indigenous supply. This compounded the problems caused by the underdeveloped indigenous supplier networks.

(3) Protection

The banning of imports eliminated competition from foreign suppliers and led to a situation where whatever could be produced could be sold. Combined with the lack of indigenous suppliers and restriction on import of inputs, the existence of a sellers' market caused firms to concentrate on the problems of procurement and production and eliminated the need to devote resources to design and marketing and development of exports.

21.1 Rudimentary Supplier Networks and Restrictions on Import of Inputs(1)

One of the fundamental disadvantages of producing complicated engineering goods in a developing country is the lower development of ancillary suppliers and subcontracting shops, plus the low quality of the products of many. Although India has developed ancillary suppliers along with the rest of its industry, these are most highly developed for mass production industries like automobiles. For complicated machinery like machine tools often requiring specialised parts in small batches, the difficulties are greater.

This is true despite Government policies to encourage the development of small scale industries, including ancillaries, by subsidised supply of machinery on hire purchase, preferential access to credit, etc.

This situation forces producers in developing countries to rely on imports for a larger share of their bought-out items, or to produce them themselves. In the first case, the producer suffers from the longer delivery periods, higher inventory costs, and freight costs of imports. This is now the case, for example, for some of Ex-Cell-O's castings and for certain electricals and special tooling required on machine tools for the U.S. market, and it is an important limit on export potential. The Indian producer is at an additional disadvantage if tariffs are charged on imports, since tariffs are often applied at the rate of 27½%.

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(1) See Jack Baranson, Manufacturing Problems in India, Syracuse University Press, Syracuse, N.Y., U.S.A., 1967.

(2) L.N. Tandon, "Tool Design and Tool Room Facilities in the Automobile Industry", Machine Tool Engineer, H.M.T., Vol. VI, No.3, July-Sept, 1965, pp 27-31.

However, when the government restricts the value of import content, imposes a time schedule for reduction of import content, or bans import of certain items to save foreign exchange and encourage domestic production, the producer may be forced to produce items himself while a similar producer in an advanced country where the items are standard could buy the items out from specialised producers who are able to achieve economies of scale. Thus, one Indian machine tool producer said that he buys out parts, components, and services worth only 10% of the value of the final product while his collaborator buys out 40%. Even in the automobile industry [illegible]tions of the ancillary supply network force Indian manufacturers to produce many of their own castings, forgings, and other specialized components and much of their own tooling while manufacturers in advanced countries buy them from ancillary suppliers. This has the disadvantage of higher cost where the lot sizes of an individual producer are too small to achieve economies of scale, and increased investment requirement.

In some cases the producer will make the item himself because there is simply no one who can make it, at least in the small quantity he needs, but at least as commonly the problem is that outside suppliers do not produce the required quality. In India, imports are banned when there is domestic production, regardless of the quality and cost of the indigenous product.

An example of this is the difficulty machine tool producers in India have in buying out castings, attachments and accessories like chucks and collets, and tooling of the quality necessary for export. There have, in fact, been serious complaints from abroad about the quality of bought-out chucks supplied with lathes by Indian manufacturers, and one has decided to send machines without chucks until better supplies are available in India. While manufacturers of machinery abroad buy out most of their tooling (jigs, fixtures, dies, gauges, etc.) from tool and die shops, Indian manufacturers are forced to producing their own tooling because there are few ancillary suppliers. Sometimes manufacturers are even forced to produce their own cutting tools because of long and uncertain delivery periods from local suppliers. Also, it is more difficult to get spare parts in India, partly because some machines are imported, partly because after sales service and supply of spare parts by original manufacturers is not as good in India as the advanced countries.

A number of units have concluded they must have their own foundries to control quality because of the low quality and high machining rejection rates of bought-out castings. HMT originally planned to buy castings out but set up its own foundry in Bangalore, which began commercial production in 1961, because of difficulties with the quality of bought-out castings. Another manufacturer is planning to undertake production of chucks itself to secure ones satisfactory for export, and yet another said it may be forced to put up its own foundry.

In other cases machine tool producers have not undertaken production of such items themselves but have gone to a great deal of trouble to get others to produce the items and quality they require.

Because of difficulties of securing bought-out items of acceptable quality on the open market, plus the Government's policy of encouraging small-scale industry, HMT provides the drawings, a tested prototype, tooling, and other technical assistance in production and quality control to small-scale units set up in its industrial estate, and it helps in financing and procurement of raw materials. These units provide all accessories, sheetmetal work, and some components. In general, items which are easily available in the open market at satisfactory quality are not manufactured in the industrial estate, e.g. fasteners, hand wheels, bearings, cutting tools. In order to build and sustain this network of ancillaries, it buys from them even at prices higher than those charged by other suppliers. Further, it has continued to buy from them even when it has excess capacity and could produce the items itself.

Telco designed the components for its column drilling/boring machine and provided the designs and the assistance of Telco engineers to the units that produce the components.

HMT often sends its engineers to provide technical assistance and supervise production of inputs. In order to develop indigenous production of the alloy steel required for machine tools, it sent its chief metallurgical engineer for six months to supervise production through the first meltings, rollings, and testings.

Some other companies which do not have their own foundries send an inspector to the foundry where they buy their castings in order to inspect the castings before shipment.

Even though the producer may succeed in getting the items produced in the desired quality this is often only after considerable delay both initially and on repeat orders, and at a high cost because of the small production lots required and other manufacturing problems. However, the problem remains that in many cases, even when the machine tool producer has provided assistance to the supplier, the quality of bought-out items is low. Problems with suppliers of raw materials are similar. Thus, the quality of sand received by foundries is low. Mukund found it difficult to get silica sand of the necessary sieve analysis even though they sponsored, financed, and supervised the sand conditioning plant in Vengurla, Maharashtra. Moreover, uncertaihties and delays in delivery from suppliers upset production schedules or else force manufacturers to hold large stocks of inputs. One company reported that it finds it must stock 6 to 9 months requirement of castings. One company which originally bought components from small scale manufacturers has decided to produce as much as possible in its own factory because of difficulties with delivery and quality.

As the machine tool industry moves into more sophisticated designs, the problems of securing components indigenously will increase. Thus, companies now using hydraulics in their machines are experiencing serious problems getting parts of the necessary quality from local suppliers. Another company reported it is having difficulty switching over to designs with hydraulic controls because of the absence of a hydraulic equipment manufacturing industry in India.

21.2 Design and Marketing

While firms engaged in import substitution during the Second and Third Plans built up personnel and experience to deal with the problems of procurement and production which were their chief concerns in the prevailing industrial environment, most did not develop similar competence in applied design of products, machinery, or plants (or, of course, basic research, which Indian manufacturers do not engage in) or in domestric or export marketing research, promotion, distribution or service.

One of the most striking differences between firms in the machine tool and other industries in India and the advanced countries is in the higher proportion of human and other resources in the advanced countries devoted to basic research, to design and development, and to marketing not only domestically but abroad. Exporting from India in competition with these countries will be difficult for products where the design development and marketing inputs are high, as in machine tools. The requirement for design modifications and for development and execution of a marketing programme will present as much difficult for many firms as the production problems of cost, quality, and delivery.

Many firms have now recognised that development of design and marketing competence would increase their ability to respond to changes in the domestic market and to take advantage of the potential of export markets. The two categories of personnel being sought in the machine tool industry, often without success, are designers and marketing managers. The Placement Office of the Indian Institute of Management, Calcutta reports much more interest in hiring graduates with a marketing training than those with a background in production-oriented problems alone. Unfortunately, it is not possible to build up either design or marketing competence on a national scale in a short period. Both require formal training and industrial experience.

21.3 The Recession and Response to the Decline in Domestic Orders

During the pst three years, there has been an important change in India's industrial environment. India is no longer a sellers' market. Because of a decline in domestic orders for industrial goods, there has been widespread excess capacity, often 50 percent or more. Moreover, even optimistic predictions forecast a continuation of significant excess capacity for at least three years, and realists foresee the possibility of future recessions.

The machine tool industry has been among the most seriously affected by the decline in orders. This is partly because it is a capital goods industry, partly because it depends heavily on purchases by Government and Government agencies and by other capital goods industries. After 15 years of steady growth, production of machine tools declined between 1966 and 1967. From early 1966 the rate of growth of almost all industrial sectors declined, and the recession continued in 1967 and 1968. The immediate result was a cut-back in production, postponement of expansion, and accumulated stocks. According to a survey by the Indian Machine Tool Manufacturers Association, utilisation fell to 50 percent of rated capacity.

Manufacturers have responded to the new industrial environment by diversifying production, increasing user-orientation and marketing efforts, and attempting to enter export markets. Although this has been a difficult period for industry, these activities have increased competition in the machine tool industry and contributed to the structural readjustments necessary for more efficient allocation of resources in the Indian economy. Unfortunately, while the recession has increased the incentives to improve market-orientation, designing, and export, it has provided no incentive to reduce overhead costs by increasing productivity.

During this period, the cost of production has been increased by devaluation and wage increases, but because of the lower level of demand and increased competition, prices have not been increased by enough to maintain the same margins over costs (average variable cost plus fixed percentage of overheads). Combined with a reduction in turnover, this has meant a considerable reduction in profits or even losses.

The machine tool producers who are doing best are the ones who previously diversified production in one of several directions:

a) Those who did not depend on orders from the Central or State Governments or training institutes for the bulk of their production (A number of companies relied on government purchases for the majority of their sales before the recession)

b) Those who produced machine tools capable of a higher rate of production or special purpose machine tools.

c) Those who produced products other than machine tools, including automobile parts and particularly consumer products like watches.

In fact, producers like Telco and Ex-Cell-O are expanding capacity in special purpose machines.

Because of the recession there has been further diversification along these lines. Together with a certain amount of subcontract work, this has allowed fuller utilisation of capacity. Diversification has been facilitated by the policy adopted by the Government allowing firms to produce new products upto 25% of their output without additional industrial licences. However, in certain cases the Government has not given licenses necessary for private sector firms to diversify into new items. For example, it rejected an application made in 1966 for collaboration with Zung of West

Germany for internal grinders on the grounds that these were to be taken up at Ajmer and should not be licensed again where this involved expenditure of foreign exchange. Meanwhile, production has not yet started at Ajmer and imports of internal grinders continue. The diversification already achieved plus that now being undertaken by the machine tool and other industries is making a significant contribution to efforts at import substitution.

One drawback, however, is that with highly diversified production, Indian firms are limited in their ability to take advantage of economies of scale in production. This is evident, for example, at HMT.

To a large extent this diversification, like the earlier development of the Indian machine tool industry, has depended upon foreign technical collaboration.

HMT has been able to design and develop several new machines with its own design staff and prototype workshop. Telco has also designed two new families of machines and is building up further design capacity while Mysore Kirloskar has just begun to move in this direction by setting up a separate design cell. Others, like Ex-Cell-O with a design staff working on modifications of its basic machines and tooling for special purpose work, have limited design offices, but many have no design facilities at all. One factor limiting the ability of many firms to offset the decline in demand by diversifications is the lack of such design capacity and the shortage of design engineers with experience in machine tools. Only limited use has been made of the Central Machine Tool Institute's facilities for design and testing of prototypes.

Another response to the reduction in demand has been an increase in market orientation and marketing efforts. Previously because of the sellers' market few machine tool producers had a market research department or devoted resources to forecast demand or to determine what users wanted; there was little effort to promote sales; and users often found pre-sales engineering service, after sales service, and availability of spares to be inadequate, especially on some indigenous brands. While none of these have yet reached the state of development in the advanced countries, customer orientation has been increased along all these lines. Manufacturers are building up their marketing departments and opening additional showrooms, spending more or advertising, arranging for sales on credit,[1] and improving after sales service.

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[1] On credit for the domestic market, manufacturers report that the interest rate charges by the Industrial Development Bank of India on 5 year loans, about 9% per annum, plus the 1½% charged by commercial banks for the guarantees required by the IBRD, was too high for many users. Moreover, numerous potential buyers have reportedly been unable to get the required bank guarantee.

Finally, the reduction in domestic demand has made manufacturers interested in export. Because prices in the domestic market were higher than could be secured on export, and because the domestic market could absorb the full output (particularly in the emergencies of 1962 and 1965) without any of the marketing effort required for export, very few companies made any significant export of machine tools before 1966. Those that did export earlier did so under special circumstances where little sales promotion was required, e.g. a few sales to collaborators, a few to East Europe arranged by the STC, a few in connection with joint ventures by Indian abroad, and a few by companies with export organisations developed for other products like pumps and engines.

The new export orientation is even more significant than the statistics on export performance indicate. In the first place, developing exports is a slow process and the efforts made by the firms most active in export - HMT and Mysore Kirloskar - are only starting to pay off. Secondly, the situation is very favourable to a substantial increase in exports. Although there are many other problems for the development of industrial exports from India, one important one has now been overcome; because of the decline of the domestic market, Indian manufacturers now want to export.

22. Cost Competitiveness of Indian Machine Tools

In order to indicate the potential return from exporting machine tools, we have worked out an example of how three medium weight, conventional Indian machine tools would compete in the US with comparable machine tools imported from other sources. If the Indian machine tools can compete in terms of price, if minor design modifications are made, if delivery and service are satisfactory, and if adequate marketing efforts are undertaken, it is realistic to assume that there will be a good market for these machines in the U.S.

The table on the following page presents the details of this exercise for 1968/69, which reflects the current situation, and for 1973/74, when we assume the Indian machine tools will be better known and accepted.

The data from the three different companies was combined by dividing all data for each company by the 1973/74 F.O.B. price of its machine, multiplying all numbers by Rs.10,000, and averaging them for the three firms. The resulting table gives an average of the situation for the three firms in terms of a machine with an F.O.B. price in 1973/74 of Rs.10,000.

The 1973/74 price of the competing foreign machine to the U.S. end-user is taken as 5% less than the 1968/69 price, because tariffs will be reduced by that amount in accord with the Kennedy

Table 6

Profit Analysis for Exporting an Indian Machine Tool to the U.S. Market

	1968/69		1973/74	
	Rs	Rs	Rs	Rs
Price of competing foreign machine to US end-user		22,686		21,677(1)
Price discount of Indian machine	4,537 (20%)		2,166 (10%)	
Price of Indian machine to US end-user		18,149		19,511
Commissions to distributor of foreign machine	5,731		5,734	
Additional commissions on Indian machine	1,145 (20%)		577 (10%)	
CIF duty-paid price of Indian m/c.		11,273		13,199
Tariff	1,253 (12.5%)		919 (7.5%)	
CIF Price of Indian machine		10,020		12,280
Freight and Insurance	2,280		2,280	
FOB price of Indian machine		7,740		10,000
Cash subsidy, 20% (2)	+1,548		+2,000	
Import Replenishment	+ 310		+ 400	
Drawback of duty and excise and subsidy for iron & steel price	+ 300		+ 300	
Expert packing, inland freight (after concession) handling	- 760		- 760	
Export marketing cost	- 500		- 500	
Ex-factory revenue by manufacturer		8,639		11,441
Cost of material, components, labour	6,377		6,101	
Return on export after deduction of material and labour costs		2,262		5,340
Overhead costs				
At normal capacity	5,105			
At 25% increase in productivity			4,083	
Return on equity before tax after recovery of all costs		(-2,843)		1,257

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(1) Prices will be reduced by 5% because of the reduction in tariffs by the Kennedy Round.

(2) The subsidy will be supplemented by an additional 5% if the manufacturer concerned increases exports by 10% over the level achieved in the previous year.

Round. For the sake of simplicity, we have assumed constant 1968/69 prices for 1973/74. In the event that India's costs and prices increase at a faster rate than those of competing exporting countries, it would be necessary to consider measures to offset the differential.

In working out this exercise, we have assumed that for Indian machines to break into the U.S. market, they would initially have to be sold to the final customer at 20% below the price of comparable machines from an advanced country, and that it would be necessary to allow an additional 20% for distribution costs above those of competing models.

Even with these concessions, the Indian manufacturer would initially cover all the material and labour costs and half of the unit overheads calculated at the normal level of production.

Moreover, the situation would be brighter five years after initiating efforts to export. Once a breakthough has been made in the foreign market and the products are accepted, the Indian manufacturers could reduce their price discounts and extra distribution costs say from 20% to 10%. Also, by increasing productivity, they could increase turnover, say by 25%, and reduce unit labour and overhead costs by 20%. This should be possible in many cases. As a result, they would not only recover all material, labour and overhead costs but make a pre-tax profit of 13% of the ex-factory revenue on the machine.

Thus, both in the short-run and the long-run, export of these particular machine tools could be a profitable undertaking, although profits would probably be lower than in the domestic market. In the short-run, export would be profitable in the sense that it would reduce the losses due to fixed overhead costs. In the long-run, export would not only cover all costs of production and marketing but would yield a positive return on equity investment.

In arriving at this conclusion, we have assumed that the manufacturer will receive two important forms of assistance from the Government. First, we have assumed that the present level of subsidies and rebates will be continued in the future. Second, we have assumed that the Government will subsidise part of the cost of market research and sales promotion and will provide credit and risk-sharing for expenditures by firms on market development.

Although the three companies that supplied data for this analysis are broadly representative of the organized sector of the Indian machine tool industry, there was no opportunity to compare the cost structures of these firms with the rest of the units in the industry to see if the profitability analysis gives a reasonable picture for the others.

Given the present excess capacity and subsidies, export of machine tools is thus a profitable matter, and it will continue to be profitable even when full overheads must be covered. The difficulty lies in inducing manufacturers to make the necessary investment in research, product development, and export marketing. The deterrents are the cost of the investment, financial difficulties of raising the money necessary for such an investment, and the risks involved. It is in this area that there is the greatest need for further Government assistance.

23. Analysis of Production Factors

The basic reasons for believing that Indian can produce machine tools competitively, and the limitations on the extent to which India is taking advantage of these, are discussed below:

23.1 Labour

In the advanced countries, labour costs are a substantial fraction of the costs of machine tool production. Foundry work, machining, and assembly all involve a higher labour input.

In India not only unskilled but skilled labour of the type needed in machine tool production has a very low cost compared to abroad. A machinist who earns at Rs 1.5 - 2.0 per hour or Rs.300 - 400 per month including fringe benefits in India would earn atleast 5 to 7 times that in Europe and 10 to 15 times that in North America (about $ 3.50). Even allowing for a larger number of man-hours in production in India, India can gain a cost advantage of perhaps 15 - 20% of total costs on the basis of the labour advantage alone.

Output per worker in Indian machine tool factories is typically Rs.10,000 - 20,000 per year, while it is about 7½ times this in advanced countries, or close to $ 10,000 in Europe and Japan and $ 20,000 in the USA.

In many cases the high cost of production in India commonly attributed to low productivity of labour is the result of inadequate management efforts at cost reduction, including production planning and control, production engineering, training, and work supervision.

However, many manufacturers complain that Government labour policies are a major reason for low productivity. They say it is impossible to maintain discipline when labour is protected.

While economists commonly assume that countries like India should specialise in low skill industries, as a matter of fact, India should be in a strong position in industries requiring skilled labour. The costs of training workers are very much lower in India than in the advanced countries.

Even at the very highest level there is a considerable saving in India in the cost of overhead personnel. For example, a graduate of a management school in India earns about 10% of what he would earn in the U.S.

There are a number of factors which offset the advantage of low wages in India.

First, with a limited stock of labour with industrial experience and the rapid growth of industry, it has been necessary for firms to invest regularly in the training of labour, often for one to two and a half years for a new worker. Virtually all manufacturers said that the formal training available in India outside the firm is not geared to the need for trained labour by industry. For example, those with vocational training would not be able to produce a part from a blueprint or even operate a machine tool without considerable additional training by the firm.

It is evident that one shortcoming of India's investment pattern has been underinvestment by the government in practical industrial to develop skilled workers. This makes it difficult for India to realise the competitive advantage it could have from inexpensive skilled labour.

Even with the training at the firm the worker does not have the experience or skill of workers available in the advanced countries at the going wage. As a result, most Indian machine tool producers say that working with comparable conventional, manually operated machines, it would take their workers longer - often 1.5 to 3 or more times as long - to do a machinig or assembly job than it would take in their collaborators' plant abroad. In the foundries, the lower level of skill means higher rejection rates.

Second, Indian firms employ numerous people who are not necessary in a machine tool factory in an advanced country, including helpers in certain parts of India, watchmen, etc. Also, a higher ratio of workers to machines (for comparable equipment) is necessary, and a higher ratio of supervisors and inspectors of inputs and products is necessary to maintain the level and quality of production. Also, some companies have an extra group of mobile workers who can be assigned to jobs when regular operators are absent.

Third, a combination of factors - reluctance to fire trained and experienced workers who would not be easily available again when demand increases, labour legislation including liberal retrenchment compensation (Industrial Disputes Act, 1947 and rules of State Governments), and the danger of labour unrest in the event of retrenchment - limit the ability of a company to cut costs by laying off workers when orders decline. This is particularly true of public sector firms. Some private sector firms have reduced employment in the recession, but not by nearly as much as the decline in orders and production.

Fourth, although wages are low compared to foreign countries, there are many complaints about the increasing level of wages and dearness allowances, arising in part out of Government wage awards, and such increases weaken India's competitive position.

Fifth, some complain that workers do not work up to capacity, or put in the equivalent of only 3-4 hours of real work per day. Moreover, authorized leaves and absenteeism are reportedly high. The Factories Act entitles workers to be paid leave of 1 day for every 20 days of work, and 10 days of casual leave per year are permitted in many collective agreements. Together this gives leaves of 8% of working days, but some companies report labour absenteeism of 10 - 15%. Moreover, because of upset production schedules the percentage loss in capacity utilisation from absenteeism is even higher than the percentage of absenteeism.

Sixth, public sector projects in particular must support extensive workers' colonies and subsidies a wide range of services and amenities.

23.2 Economies of Scale

One of the reasons for believing that India has a potential comparative advantage in machine tool production is that economies of scale are of comparatively limited importance in the machine tool industry. This is because even in the advanced countries machine tools are produced in relatively small batches and volumes when compared to items with a mass market like fractional horsepower electric motors, automobiles, or household appliances, and it is not economical to use mass production techniques. Thus, even in the advanced countries there are relatively small machine tool producers who are able to compete.

Nevertheless, Indian producers do have a disadvantage because of their smaller scale of production. Typically, if there were no recession, Indian machine tool manufacturers would be producing at rates of 10 to 40 units (counting all variants) of each model per month for standard machine tools like lathes, milling machines, etc. In the advanced countries, collaborators and competitors commonly produce the same machines at rates of ten times this or more. Consequently batch sizes in India are much lower than abroad. However, because of economies of scale in production of larger batches, batch sizes of parts produced by Indian manufacturers are not as low as monthly volume of production of finished machines compared to advanced countries. Instead, Indian manufacturers have a higher ratio of batch size of parts to monthly volume of finished machines and maintain a larger inventory of parts in relation to output. Often the inventory/turnover ratio may be 2 - 5 times as high in India for items produced by the manufacturers.

India's largest machine tool producer, HMT, has an extremely diversified production range. Together with the division of production among four different locations and resulting duplication of functional facilities because of the Governmental policy of regional balance, this limits economies of scale despite the size of the company.

At one Indian machine tool company, the head engineer estimated that with a six-fold increase in batch sizes, it would be possible to install different machinery which would leave the capital output ratio unchanged but reduce average direct labour requirements by one-third.

This lower volume of production is due to the smaller size of the domestic market and the very limited exports of the Indian machine tool industry; many producers in Europe export over half their output.

Because of the lower volume of production in India, batch sizes are smaller and hence set up times are spread over fewer units. To give an example using realistic numbers, if set up time is 60 minutes and machining time is 8 minutes per unit, average total time with a batch size of 100 is 8.6 minutes and with a batch size of 20 is 11.0 minutes, or 28% longer. The investment in blue prints, operation sheets, jigs, fixtures, and other tooling is higher in relation to output. There are problems in balancing capacity at a low volume of output which lead to higher unit capital costs. Batch sizes and volume of production do not justify use of special purpose and automatic machines which make it possible to reduce unit costs where output is greater. Thus, because of the lower volume of production, Indian producers are unable to spread some of their labour and capital overheads and to use machines which would reduce the labour and/or capital costs per unit of production. Naturally, given the low wages in India, and the small percentage of total costs accounted for by labour costs, it is the economies of scale in capital costs that would be the chief source of gain from larger volume of production.

23.3 Rationalisation and Standardisation of Work and Materials

As already noted, productivity in the machine tool industry is sensitive to the batch size of production due to distribution of the setting time over the batch size. Efforts should be directed at reduction of setting time per unit workpiece. This can be achieved in the following ways:

i) increasing the batch size to distribute the setting time over the larger batch for a specific machining operation.

ii) standardisation of components so that the overall setting time for a group of operations or workpieces to be machined is less than the sum total of timings for individual machining operations.

iii) reduction in setting time by minimisation of number of operations and tools.

The advantage of standardisation is greatest where large numbers of different machine components are required in small batches; standardisation permits production of larger batch sizes. Other advantages of standardisation are improved flow of work, more effective use of labour and machines, reduction of setting and tooling costs, simplification of rate-fixing and, in some instances, reduction of stocks and patterns. These advantages have led to the evolution of design and construction of special purpose machines and subsequently of general purpose machines on 'building block' or 'modular' principle. This modular design has been adopted almost universally by the leading manufacturers of the world. Even components such as gears, spline shafts etc. are standardised. Thus, for instance, machine tool manufacturers in the USSR use about 40 percent standardised components, and designs of 65-70 percent of components manufactured on automatic lines utilising transfer machines are standardised to facilitate mass production and to ensure fitting during assembly. Fixing devices, clamps, jigs, power heads, unit heads, turning tables and many other parts are standardised in many plants.

In India lack of standardisation and interchangeability has proved very wasteful. This situation is largely the result of the many collaborations with different foreign countries and imitation of other foreign designs by Indian manufacturers. For example, the number of collaborations which Hindustan Machine Tools, Mysore Kirloskar and Cooper Engineering have had in machine tools is 18, 3 and 4 respectively, and in addition there are the designs evolved by these firms independently without foreign collaboration. The designs supplied by the British and American collaborators, being in foot-pound system, have accentuated the diversity of parts in Indian plants. Further, tools also need standardisation.

Some Indian machine tool manufacturers have initiated detailed and systematic study of standardisation and rationalisation. The progress made by the Hindustan Machine Tools in this direction is shown in the following table. This study also included rationalisation of tools and equipment, which resulted in deletion of about 55 items from the inventory.

Results of Rationalisation by Hindustan Machine Tools

Material	No. of Stocked Items		No. of deleted items	Percentage of items deleted
	Before Rationalisation	After Rationalisation		
Cast Iron	43	17	26	60
Mild steel	139	47	92	61
Constructional steel	288	198	90	31
Tool steel	50	19	31	62
High speed steel	58	22	36	62
Aluminium alloys	55	37	18	32
Copper	21	9	12	57
Bronze	43	10	33	76
Brass	38	10	28	74
Total ..	735	369	366	50

Source : H.M.T. News Digest - Vol. I, No.9 - January, 1967.

23.4 Rationalisation of Steels

In 1954 the Indian Standards Institution conducted a survey to determine the varieties of steels used in India. The survey revealed that there were over 1,500. To facilitate production in India in volumes, and to reduce the use of imported materials, the ISI specified 156 categories for wrought steels for general engineering purposes, and further reduced it to 70 during the foreign exchange crises.

The Central Machine Tool Institute (CMTI), Bangalore, has made a significant contribution to standardisation by developing a group technology system based on Czech procedure which classifies parts on the following four bases :

1) Kind with reference to the shape of the part, whether round, flat, cubic, irregular etc.
2) Class which defines the size of the part within nine categories
3) Group according to presence of gear teeth, threads, holes, flanges, angular surfaces etc.
4) Material divided into nine categories such as cast iron, alloy steel and the like.

A workpiece classification chart with diagrams is provided by the Institute, as well as an instruction manual, which enables each workpiece to be identified in accordance with these four headings and at the same time to receive a 4-digit code number.

The major purpose of the classification is to make it possible to achieve economies of scale even for small lot production by grouping together certain machining operations for similar parts, thus allowing reduction of set up time and tooling and economical use of higher productivity machines or special tooling.

The potentials of workpiece classification are indicated by a study of the machine tool industry in advanced countries, which showed that 58% of parts can be provided by turning, and of these 38% have a hole through the axis of rotation while 63% of them are made from blanks with diameter not exceeding 16 inches.

The Mysore Kirloskar Ltd., has been prompt in adopting this system. A large number of components have been identified and classified for machining on the above group basis. Two typical cases of this application are described here.

In one instance, eight turned components comprising spacers, washers, coolars and bushes have been grouped for machining with standard tooling on a Herbert No.4 capstan lathe. Before these components were grouped for machining, the time for setting up the capstan lathe for each omponent wasabout 60 minutes, with a total of 485 minutes for the eight workpieces. With grouping, the total setting time has been brought down to 105 minutes including small adjustments to the machine (when the drill and the reamer must be changed in some instances) for the entire range of eight parts. In another instance, overall setting time has been reduced from 225 to 50 minutes by grouping together four different workpieces.

In some cases it may be found that design changes which do not affect performance can make it possible to include a workpiece in a particular group, whereas it would otherwise have to be machined separately. Perhaps three or four similar spacers or bushes can be replaced by one common piece of new design. Thus a wide range of hand-wheels of different designs was used earlier for machine tools built by the Mysore Kirloskar for application to cross slides, carriages, compound slides and tailstocks. These have been replaced by a simplified range of six hand wheels capable of satisfying the requirements for all machines.

A factory whose monthly product-mix consists of 15 capstan lathes, 5 turret lathes of one type and one sophisticated turret lathe has partly overcome the disadvantage of this heterogenous production by devising common tooling.

Plans are under way with Cooper Engineering Ltd, to adopt the CMTI group technology system.

23.5 Material Inputs and Components

The current import content of the machine tools India will export in the immediate future is not over 10%, and generally is a good deal less than this. It will decline even further when there is indigenous capacity for all the alloy steels. The large majority of raw materials and components are thus purchased locally.

One potential source of a comparative advantage for India in engineering goods including machine tools is the natural resource and metallurgical base of the country. Unfortunately, this indigenous supply has not meant that iron and steel prices in India are at the international levels. Nevertheless, the scheme for reimbursement for the difference of the Indian and international prices of iron and steel removes much of the obstacle to engineering exports arising out of the higher prices of Indian iron and steel.

The most serious problems with raw materials are at the foundry stage ; shortage of foundry grade pig iron, difficulties in securing pig iron according to specification (mixed grades, high sulphur content), high ash content of coke, and low quality sand are long-standing complaints of the foundry industry. The resulting problems of quality and higher cost (e.g. the cost of sand conditioning, rejections) and the difficulties faced by machine tool producers in securing bought-out iron castings of acceptable quality are discussed in the section on foundries.

There are problems of raw material availability at other stages of production as well. Thus, an Indian firm with U.K. collaboration producing fasteners used by the machine tool and other industries is unable to supply countersunk screws and bolts of high quality because of difficulties in getting the necessary high chrome steel.

Manufacturers of metal-forming machine tools have difficulties securing the mild steel plates required for machine tool frame work. One producer reported being forced to buy plates on the open market at Rs 1600 per ton, because they were not available at the control price. However, the plates purchased are often untested. This means the manufacturer must pay for testing, and even after rejections it finds that the tensile strength is 10% less than of plates used by European machine tool producers, which means the Indian manufacturer must increase the thickness of steel to compensate.

More generally, there are difficulties getting the specifications required and often deliveries do not meet the specifications stated and paid for. Because of this, HMT finds it necessary to inspect all materials used, and many companies report increase in costs because of rejections, particularly when these occur after machining. Undoubtedly, the quality of the products of many manufacturers suffers because they do not have such inspection facilities or have no way to correct for low quality of inputs.

Another difficulty with raw materials is that the shapes and sizes of special steels available is much more limited than abroad, so producers are sometimes forced to do considerable extra machining.

Often delivery periods are long. For example, the delivery period on cutting tools has been 8 - 18 months.

Apart from difficulties of supply, prices are higher for raw materials in India, e.g. alloy steel. Moreover, except for iron and mild steel, the difference in price is not reimbursed to exporters. Thus, there is no reimbursement on alloy steel.

The difficulties with availability of bought-out co components, low quality, and delivery problems are discussed in connection with India's rudimentary supplier network. Often the prices of such components produced in India are about 40 percent higher than abroad. Indian-made Siemens electro-magnetic clutches for HMT machines were priced at 40% above the landed price of the imported Siemens. However, the price of Indian-made hexagonal socketed screws purchased by HMT is 2½ times the landed price of imports. Cutting tools are reported to be 50 - 100% more expensive in India than abroad, in part because of the higher price of alloy steel.

It would be a mistake to give the impression that all parts are more expensive in India. Particularly when the comparison is between the cost of production (rather than buying out) in India and the landed price of imports (including freight and duty and sometimes inflated by the supplier), there is a wide range of items where domestic production is less expensive. This is a major incentive to increase indigenous content. Thus, one Indian machine tool manufacturer reported that costs would be substantially reduced on gears when domestic production was undertaken. Another is presently trying to produce a clutch domestically for this reason.

It would be possible to export machine tools to advanced markets without certain high cost components like electricals. However, fitting electricals abroad is very expensive because of high wage rates.

The major exporters report that they have had troubles with materials necessary for shipping. There has been difficulty in getting high quality packing wood, and it is reported that manufacturers cannot get satisfactory rust preventives in India, with the result that sometimes machines arrive damaged.

23.6 Capital and Overheads

Although the investment ratio can vary, in an efficient machine tool plant in India the value of annual production at capacity operation is about equal to the level of investment in plant and machinery.

There are a number of factors which raise overhead costs in India. Overheads are higher in relation to turnover because of lower reliance on bought out components and services. Overheads are higher in relation to value added because of difficulties in balancing plant at a low scale of production, raw material and power shortages, shortages of critical skills which prevents full three shift operation, higher percentage of time lost due to breakdowns, slower performance of tasks by workers, higher average set up times and tooling costs because of small batches, larger inventories, and shortcomings of production management (e.g. inventory management, product engineering, production scheduling). Of course, at present lack of orders means average overheads are especially high, since capacity utilisation has often been only about 50%.

In the short run, as long as there is excess capacity, the Indian manufacturer can reduce his losses as long as the export price, including subsidies, is more than his variable costs. Since labour and capital overheads represent over half of the costs of production at the normal level of production, and subsidies are more than 30% of the FOB value, exports will help to reduce losses if they can be sold at an FOB price of only 40% of the unit cost of production at normal capacity.

The area with the greatest scope for cost reduction is in increasing the output which can be achieved with given plant and equipment. Through application of the techniques of management science, such as production planning and control, it should be possible for most manufacturers to increase their output by 25% above the normal level of capacity, **and thus reduce average total** costs by at least 10%. This can be done, for example, by taking measures to reduce machining times and to reduce the percentage of rejections.

One serious difficulty, however, is lack of incentive to increase productivity. Prior to the recession the constraint on production in India was often shortage of material inputs. Given the fixed nature of capital and labour costs there was no immediate incentive to increase productivity by speeding up work. During the recession the constraint on production has been demand for machines, and again, given the fixed nature of capital and labour costs, there has been no short run incentive to increase productivity. The unfortunate result is that industry has not learned the techniques required for highly efficient production, and once the situation of excess capacity ends, overhead costs of production will be higher than would have been attainable if the industrial environment had provided continual incentives to increase productivity.

Another difficulty is the higher price of capital goods in India. The price of imported equipment is increased by freight, tariff, and restriction of source to rupee payment areas or countries providing tied aid. Restriction of source alone may mean the Indian firms must pay 40% more than the price of a machine from the cheapest source.

In the context of overhead costs, it should be noted that Indian manufacturers also have higher inventory-value added ratios and hence working capital costs than foreign manufacturers. This is true especially for imported inputs; because of uncertainties about the availability of licenses, delays in licensing, and extended delivery and shipping times, some companies stock a year's requirement of imported parts. However, the problem is not confined to imports. Uncertainties and delays in deliveries from local suppliers force manufacturers to hold larger inventories of local inputs. For example, one company maintains stocks of castings sufficient to meet 6 to 9 months requirements. Higher inventories are maintained even for parts produced by the machine tool manufacturer itself. To achieve economies of scale on batch size, Indian producers typically operate with a ratio between batch size of part and turnover of finished machines of 2 - 5 times the level abroad, and consequently inventories of such parts are 2 - 5 times as high.

23.7 Difference in Technique and Machinery

Although the machinery installed in many of India's machine tool factories is reasonably new and much of the machinery is imported,[1] there are many difference in the production techniques and equipment used in India and in machine tool factories making comparable products abroad. This reflects both a difference in industrial environment - lower labour costs in India, smaller volumes of production, and more limited financial resources - and limitations on import of machinery.

One difference is that a number of operations are done by hand in India that would be mechanised abroad. More important are the differences in the types of machines used for various operations. Most of these differences lead to higher output per machine hour and labour-hour abroad. Although there are naturally exceptions in the case of some firms, and in some cases the differences are only in degree, the following is a list of typical comparisons.

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[1] Among the machines found at the leading factories are Swiss Maag gear grinding machines, Churchill slideway grinding machines, DeVileg Speramatic Jigmills, etc.

India	Abroad
1. Manual	1. Mechanized
e.g. Hand scraping of castings; Material and parts handling chiefly manual	e.g. Grinding of castings; Material and parts handling with specialised trucks, cranes, conveyors, containers.
2. Machines with low metal removing capacity per hour	2. Machines with higher metal removing capacity per hour
e.g. (a) Shaping and planing machines;	e.g. (a) Milling and plano-milling machines;
(b) Machine tools with single cutting tool or one operation at a time.	(b) Machine tools with several simultaneous operations e.g. internal and external grinding, multi-head millers and plano-millers, multi-spindle automatic lathes, gear cutters which cut all teeth at once.
3. Machines with mechanical power	3. Machines with devices operated by pneumatic, electric, and hydraulic power, pre-selection of speeds and feeds, plug board or tape control, capacity to perform numerous different operations, pre-set tooling, tool changers, automatic transfer of work piece from station to station, built-in measuring and quality control devices, automatic lubrication, and other features which permit automatic work cycles.
4. Standard general purpose machine tools	4. Special purpose machine tools

5. Lesser use of tooling like jigs and fixtures	5. Greater use tooling like jigs and fixtures, which saves on set up and machining time and leads to increased accuracy.

23.8 Maintenance and Breakdown

Because of differences in design, machines in India require in some respects more careful use and greater preventive maintenance if the losses due to breakdowns are to be kept down to international levels. Design and maintenance features commonly found on machine tools abroad include:

(1) Automative lubrication of slideways and moving parts.

(2) Longer life of alignment accuracy because of use of pre-loaded bearings and other spindle design features.

(3) Protection of slides by covers.

(4) Safety devices to present damage to machine as well as injury to worker.

(5) Installation of electrical controls and relays in an adjoining dust-proof, oil-proof and easily accessible sheet metal cabinet, rather than housing them inside the body of the machine.

In fact many machine tool producers do not do preventive maintenance consisting of scheduled lubrication, inspection, and overhauling by a special maintenance force, while this is regularly performed in developed countries. In Indian machine tool units, maintenance is typically unorganized and unscheduled. This is particularly true for medium and small units, while it is not true for some leading firms. The resulting higher level of unscheduled breakdowns leads to reduced utilization of capacity in India. In addition, the life of machine tools is shorter as a result, and the productivity of the machine during its lifetime is lower.

23.9 Foundry Costs

One reason that India can compete in machine tools is that it has a potential cost advantage in production of cast iron components.

The foundry industry is labour intensive. India already exports lower grade iron castings like pipes and manhole covers. In the case of mass produced castings, producers in the advanced countries can offset muct of the disadvantage from their higher unit labour costs by automating production. However, in the case of complex castings for machines produced in small batches, while some operations like moulding are manual in India but mechanized in advanced countries, the scope for reducing costs by automation is limited. Production involves a great many manual operations starting with pattern making and including core making, preparation of the moulds, and cleaning and rough grinding the castings. Furthermore foundry work is very unattractive because of the dirt, noise, smell, and heat, and consequently foundry work in advanced countries commands a wage premium. Interestingly, in U.K. foundries many of the workers are Indians.

In practice, there are several factors which counterweigh the advantages stemming from labour intensity.

The basic problem is that quality is low by international standards. This means that the rejection rate of virtually all Indian foundries producing complex and precision castings is high compared to typical international levels. Even the major machine tool foundries have rejection rates, before or during machining, of 10 - 35% compared to about 3 - 7% in a foundry in the U.S. or other advanced countries. Other Indian foundries have even higher rejection rates, and several machine tool manufacturers have reported rejecting 50 - 60% of bought out castings delivered from suppliers. Although the pig iron content can be recovered, three-fourths of the cost is represented by consumed materials, labour, and overheads and is lost.

Moreover, even with such rejection rates, the accepted castings are not up to international standards. In producing units for export all Indian machine tool producers select the best castings from a batch for export. This means that the rejection rate necessary to achieve export standards is extremely high. Table 7 presents a list of the major casting defects and their effects. Apart from increasing machining and assembly hours, these defects in castings lead to multiplication of handling and transport costs and upset production schedules and deliveries.

Table 7

Major Casting Defects and Effects on Cost and Quality

	Casting Defect	Effect on Cost and Qaulity
1.	Dimensional inaccuracy of casting	Necessitates grinding or pneumatic chipping to restore accuracy, ensure contour-matching and remove obstructions to moving parts like gears.
2.	Frequent occurrence of blowholes due to gas inclusions	Most of the blowholes are concealed and are discovered only after rough machining. This leads to rejection of machined castings and hence loss of machining hours.
3.	Thickness of thin-walled castings is increased due to limited flowability of metal and to minimise blowholes	The normal machining allowance should not exceed 3.2 mm (1/8") in thickness. Additional thickness upto 10 mm requires avoidable additional machining to remove reduntant material.
4.	The surface of castings is very rough and uneven	Considerably additional grinding is required to secure smooth surfaced castings
5.	Cores are often omitted or shifted	The cores in incorrect locations are plugged by welding and new ones are drilled in requisite locations. At times the core omission or shifting requires drilling in a position which is not directly accessible due to interception by a blind casting face. In such cases a dummy hole has to be gas-cut in the blind face to provide access. The dummy hole is again filled up with metal and welding.
6.	Castings are not annealed properly and hence become distorted	Grinding is required to restore squareness of distorted castings. At times distortion develops after machining, requiring regrinding of surfaces.

Table 7 (continued)

7.	Surface hardness is not uniform and there are spots of localised hardness due to presence of carbides and phosphites.	Localised hardness breaks cutting tools during machinery and necessitates repeat tool setting on the machine.

The reason for low quality is partly the quality of raw materials available and partly the fact that foundry work in India relies heavily on the skill of the worker.

The quality of pig iron, coke, and sand are all low. In fact, some foundries would like to import part of their requirements, but this is not allowed. There is shortage of foundry grade pig iron in India, and pig iron supplied to foundries is often ungraded, containing both high and low manganese types, and has high sulphur and phosphorous content. Coke has high ash content, often 10 – 24%, or two to three times the level in coke available in advanced countries. Also, a substantial share of some coke consignments is lost in transit or arrives in small bits. Sand is not the refractory quality available abroad, and proper bonding materials are not available. The result is extra costs to inspect and improve the inputs before use, such as sand conditioning; loss of heat in the melting and hence higher fuel consumption; and lower quality castings because of difficulties in controlling composition and melting and low quality material. Moreover, the cost of materials is higher in India, though the price difference on pig iron is rebated on exports.

In the absence of highly experienced and skilled workers, it is important to make foundry operations more routine and scientific to reduce the demands on the skill and judgment of the individual worker. In this, many foundries would benefit from technical collaboration. Short of this, more fixed procedures and stricter control are necessary.

Despite these problems, for at least some Indian foundries production costs are lower than in the advanced countries. The cost or price of castings in India is generally Rs 1.5 - 2.5 per kg. Two machine tool manufacturers with their own foundries have begun to export iron machine tool castings to machine tool manufacturers in advanced countries. However, two manufacturers reported that while they had produced sample machine tool castings for foreign buyers, these were found to be of unacceptable quality. There is a good market potential if these problems can be overcome, because machine tool producers abroad generally buy-out their castings anyway.

Another serious problem is on freight rates, which are high in relation to F.O.B. value, especially since closure of the Suez Canal. However, shipping conferences have allowed special concessional rates about 50% below the scheduled rate on an individual basis to promote exports.

Castings exports currently receive a cash subsidy of 20% of F.O.B. value, import license of 5% of F.O.B. value, rebate for excise on pig iron and reimbursement for the differences of Indian and international prices of pig iron. This comes to a total of about 32% subsidy on F.O.B. value.

24. Foreign Exchange Costs

(1) Capital

Because of the excess capacity in the machine tool industry, very little foreign exchange will be required in the next five years for import of machinery. Very likely only certain balancing equipment has to be imported, and this would be required eventually anyway for domestic production.

When machine tool demand recovers so that export would require expansion of capacity, there will be an additional foreign exchange cost of exporting. It is estimated that investment in machine tool production facilities requires imports of capital goods and of inputs to manufacture capital goods in India of 40-45% of the value of annual production capacity. In addition, this expenditure would have to be made before the capital could be used for production, and perhaps three years before the normal production level could be reached. Because of the high precision required in machine tool production, the requirement for imported machinery is greater than for the engineering industries in general, where the direct and indirect import content of capital goods is 30 - 35% of annual productive capacity.

(2) Know-how

If foreign know-how is used, after tax royalties are often about 2½% of the value of output over the period for which the agreement is in effect, normally 5 - 10 years, and would be paid in foreign exchange.

Often such agreements prevent India from exporting the product, or limit the right so that India is allowed to export only to nearby developing countries. If India wants to export before the end of these agreements, it would presumably have to pay a higher royalty to the collaborator. Some agreements allow export but at a higher roaylty payment, e.g. after tax 3½% compared to 2½% in the domestic market.

Since some machine tool companies are partly foreign owned, any profit on export from these units could lead to some increase in foreign exchange repatriation. However, in these cases the collaborators do not charge royalties.

Nevertheless, on the bulk of machine tool exports, particularly from HMT and Mysore Kirloskar, there is no outflow of foreign exchange to collaborators.

(3) Current Import Content

The import content of direct and indirect current inputs for machine tool production for export would not average more than 10% of the F.O.B. value. Although the import content of newly established sophisticated lines may be considerably higher, the direct import content of established, general purpose machine tools of the type that will be exported initially is 3 - 8% of F.O.B. value. As India exports somewhat more sophisticated machine tools, the import content will tend to increase, but this will be offset by increasing import substituion in materials and components used in machine tools.

In standard machine tools, current imports are limited to some high precision bearings, some of the alloy steel, and small amounts of non-ferrous metal and hardware items and accessories. Imports of alloy steels are being reduced as indigenous production increases.

On more sophisticated machines, current imports also include special castings and forgings, electricals like electro-magnetic clutches, brakes, relays, drives, and hydraulics like oil pumps.

When production of a new model is initiated, the import content on the first batches may be about 50%. However, this is reduced as production is established in India, and export would not be undertaken until the import content had been substantially reduced.

Because of the special requirements of export markets, it may be necessary to have a higher import content in export units than in units for the home market, particularly with regard to electricals, and the Government should take a liberal attitude in approving such imports.

(4) Marketing

Finally, there will be a substantial expenditure of foreign exchange on market research, sales promotion and market development. To the extent that this is done by the distributor in terms of printing and mailing of catalogues, advertising in trade journals, etc., it will be paid from the mark-up he charges above the CIF price and will not have to be deducted from foreign exchange earnings calculated from the F.O.B. price.

However, Indian manufacturers and the Government must spend additional foreign exchange on market research and promotion, particularly for building up India's image as a supplier of engineering goods. We estimate that an average of

$ 400,000 - $ 500,000 per year over the Fourth Plan must be allocated to this. Again, it must be recalled that this is a long-term investment. Moreover, it will benefit not only machine tools but India's overall image as a producer and supplier of engineering products, and thus it will help other exports as well as encourage foreign collaboration and investment in India.

(5) Credit and Consignment

One of the attractions of the advanced market economies is that they pay for imports in hard currency and do not require credit beyod 30 - 45 days after arrival of the goods.

However, in order to break into a market, initially it will be necessary to send machines on consignment to the distributor, not only for stocking abroad but for installation at users' plants on a trial basis.

25. Quality

Quite apart from matters of design, a wide range of the products manufactured in India are not produced to the quality standards typical abroad and necessary for export.

In some cases the problem is with materials, such as shortage of graded pig iron or poor quality of sand available to foundries. Often, however, the difficulty is with poor workmanship at the metal-working or assembly stage. This is partly the result of a lower level of experience and a lower value given to careful work. Many Indian machine tool producers who have seen Swiss or German workers have noted the organised fashion in which they work and their concern with precision and careful finish. The lower quality of Indian products is also due to failure of management to provide supervision and to adopt quality control procedures adequate to offset the standards of workmanship.

In the machine tool industry, the result has been that the finish of machines for the domestic market is not up to export standards, and overseas agents have complained of this. The quality of sheet metal work, finish of castings, painting, and details such as screw holes is low. The problems are even now serious for many small scale units.

Consequently, for export, the major machine tool manufacturers have found it necessary to give more attention to details of finish. In addition to specifying higher standards and stricter inspection procedures, one has reorganised quality control to place it directly under the top management. The head inspector must now sign every dispatch certifying that the machine is of export quality, and he is directly responsible to the managing director. By instituting proper controls, it should be possible for the Indian machine tool industry to improve quality without a significant increase in costs.

The Indian Standards Institution has laid down specifications and test procedures and standards for certain machine tools, accessories, and parts. So far it has published standards specifying minimum geometric accuracy and standardizing machine characteristics like speeds, feeds, tool post heights, etc. Items like coolant pumps and milling machine arbors have also been standardized. A list of ISI standards is given in Appendix 15.

Machine tools are not subject to export inspection and quality control under present Government procedures. The present system of grading machine tools in India according to standards set down for Government procurement has no relation to the quality standards required for export. Grading is based primarily on geometric accuracy. Apart from geometric accuracy, other conditions for receiving Grade I classification are that the firm have at least certain minimal production and testing facilities, that records be kept of the steel used for important parts like main spindles, drive gears, and leadscrews and that castings be seasoned and have slideways with hardness between 180 and 220 BHN. Grading does not really take into account materials, workmanship, design, or other features which determine the productivity of the machines or how long the machines or their accuracy will last.

It would be useful to replace the present system of grading by a more thorough quality standard, with machines given a rating along a four point scale for each of several criteria. The rating could be done by CMTI, which has the required testing facilities.

Only machines above a certain level according to the quality criteria should be eligible for subsidies from the MDF for market development. The quality cut-off for eligibility should be highest for the first priority markets and lower for areas like the developing countries where there is a demand for lower priced, lower quality machines. In view of the difficulties encountered by some machine tool exporters because other Indian companies, chiefly in the small scale sector, have created a bad name for India by sending very low quality machines, it might also be advisable to require a certain quality standard for export. Again, this would be lower for exports to the developing countries than to the first priority markets.

26. Design Capacity

This report has emphasised the importance of having the Indian machine tool industry develop new designs. This involves both modification of existing designs and development of designs which are fundamentally different from the ones now being produced by most units. The increase in emphasis on design is important both for export and the domestic market. Even in the domestic market new designs are necessary to sell machines and for the sake of the productivity and cost competitiveness of the other engineering industries which use machine tools.

Although HMT and Telco have strong design and development sections, it would be advisable for other units to move in this direction. Apart from relying on their own design cells, machine tool companies can use the services of CMTI or foreign collaborators. There is a scarcity of domestic consultancy firms, although HMT and Fritz Werner are understood to be considering a joint venture which might make a contribution in this direction.

26.1 Central Machine Tool Institute

The CMTI was set up by the Government of India with financial and technical assistance from Czechoslovakia. The Czechoslovak Research Institute of Machine Tools and Cutting Tools, Prague, assisted by providing Czechoslovakian experts. Although there are only three at present, at one time there were fourteen. These experts have been responsible for training Indian counterparts in India, and Indian engineers and designers have also been trained in Czechoslovakia.

The CMTI has designed a number of machine tools, attachments, and parts, built and tested prototypes, and licensed their commercial production at manufacturing firms. (See list below). It has also tested existing machines and prototypes of new ones for a number of companies and suggested modifications.

The principal users of the testing facilities to date have been H.M.T., Batala Engineering, Paramar Mechanical Works, Acme Engineering, P.S.G. Industrial Estate (Coimbatore), and Madras State Small Industries Corporation. Bharat Fritz Werner, which is located nearby, uses its precision inspection facilities.

So far the charges for use of CMTI facilities have been largely nominal. The payments made for licences of CMTI designs have covered only 30% of the costs of developing the designs and building a prototype.

Also striking is the fact that at present the CMTI's design and testing facilities are utilised to only 30% of capacity by the machine tool industry. Many of the firms in each size group have not made any use of these facilities.

Part of the explanation is that the CMTI started to function in June 1962 and moved into its own buildings only in July 1965, and many of its personnel are new and only gaining experience.

Also, there is a preference for designs from foreign collaborators since these have been thoroughly debugged and commercially tested. Moreover, they can be put into production faster. The designs already exist and have been tested, and the collaborator can supply some of the components initially so that manufacture can be started before arrangements have been made to produce all the components indigenously. For example, if CMTI were to design an entire general purpose machine tool for production in India, basing it on designs produced abroad, it would probably take about 18 months to develop the design and 3 years to build the prototype and complete testing.

Nevertheless, CMTI, has developed a number of machine tools, parts and attachments which have been licensed to various manufacturers. The following list gives the items licensed and the licencees. It is important that industry utilise the facilities of the CMTI to a greater extent.

Commercial Application of Designs Developed at CMTI

Design	Licensed to Manufacture
1. Drilling Machines	
a. 6 mm capacity, bench-type	Precision Engineering Industries, HMT Industrial Estate
b. 25 mm capacity, pillar-type with turrent head	Craft Tools, Harihar
2. Radial Drilling Machines, 50 mm capacity	Madras State Small Industries Corporation

Design	Licensed to Manufacture
3. Tool Room Milling Machine	Perfect Machine Tool, Bombay
4. Broaching Machines	
a. 6 ton capacity	Acme Engineering Poona
b. 10 ton capacity	New Bemco Engineering Products, Belgaum
5. Gear Tooth Rounding Machine	HMT
6. Pipe Bending Machine	Lakshminarayan Industries, Harihar
7. Hydraulic Copying Attachment for Lathes	
a. Model 1	Star Textile Engineering Works, Bombay
b. Model 2	C.R. Sonalkar, Harihar
8. Tapping Attachment, upto 16 mm	Micron Industries
9. Hydrulic Copy Milling Attachment	Batliboi
10. Drill Point Grinding Attachment, 10 mm capacity	Machine Tool Corp. of India, Ajmer
11. Lathe Tool Point Grinding Attachment	Machine Tool Corp of India, Ajmer
12. Hydraulic Cylinder	HMT, G-13 grinding machine
13. Hydro-mechanical Drive for Planning Machine	Beco
14. Die Sinking Attachment	Batliboi
15. Hydraulic Power Pack	Batliboi C.R. Sonalkar, Harihar
16. Gear Pumps	Batliboi Star Batala
17. Multiplate Clutches	Nagarkar Clutches, Poona Batala.

In addition, CMTI is now developing a simple programme control unit which can be fitted to machine tools. CMTI has also undertaken re-designing of existing Indian machines. The gear box of a planing machine was redesigned, and the mechanical gear and pulley driver was replaced with a simplified gear system and hydraulic clutches. The cast iron rocker arm on a shaping machine was replaced by a fabricated steel structure.

26.2 Prototype-cum-Training Centres

To assist in the development of machine tool designs and design capacity, the Government has set up a Prototype Centre at Howrah with collaboration of the Government of Japan and Prototype-cum-Training Centres at Okhla and Rajkot, with West German and TCM assistance respectively.

26.3 Foreign Collaboration

Foreign collaboration has played a crucial role in the development of the Indian machine tool industry by supplying designs and know-how. Moreover, the debt to foreign technology goes even further, since even "indigenously designed" machines are basically copies or hybrids of machines produced in the advanced countries.

In addition to designs, collaborators provide manufacturing know-how, send experts to India and train Indians abroad.

Against the advantages of reduced delay and risk, reliance on foreign collaboration has several drawbacks. First, there is the same conflict between reliance on imports versus development of domestic capacity in the case of applied design that there is in the case of manufacture of industrial products in general.

Second, the costs of collaboration are probably higher than the foreign exchange transferred as technical fees and royalties. It is not uncommon for an Indian company to pay very high prices, sometimes twice the normal price, for components imported from the collaborator, presumably in part since this form of payment to the collaborator avoids tax liabilities and permits a return to collaborators higher than the guidelines set by the Government. Often sale of components is the collaborators' major interest in the agreement.

Third, there are very often restrictions on export of machines produced under collaboration.

Fourth, often collaborators have not given the most recent designs available or provided for continuing inflow of the latest developments. Typically, though not always, the machines now produced under collaboration are older and even obsolete models which are no longer produced by the foreign collaborators. For example, in some cases where the machine tool produced in India is purely mechanical, the collaborator is now producing machines with hydraulic mechanisms. This is true of metal-forming machines produced by Scottist India Machine Tools under collaboration from Scottish Machine Tools of U.K.

Fifth, designs supplied by collaborators are generally put into production in India without making any modifications which might make the machine more suitable to Indian conditions. There are a few exceptions to this. HMT has changed material specifications in the interest of rationalisation, and some other manufacturers have changed specifications to use materials available in India. Some with USA and UK collaborators have made changes to the metric system. Some with USA and UK collaborators have made changes to the metric system. Scottish India Machine Tools reported that it made design changes because of the lower permissible rise of temperature of motors, clutches, etc, under tropical conditions. However, in most cases no change is made in the design, and until the past few years few changes were made in the material specifications.

This situation is partly the result of Government restrictions on collaboration agreements. The Government's basic guideline is that collaboration agreements should be limited to 5 years from initiation of commercial production. This means that payments to the collaborator and restrictive clauses end sooner, and hence the collaborator's interest in the agreement is reduced. Most Indian machine tool manufacturers think that collaborations should normally be allowed for 10 years.

Restrictions on duration and renewal have made it more difficult to get the most up-to-date designs and have hindered the transmission of advances in design and technology during the course of the agreements. However, it must be noted that on sophisticated machines like transfer lines the Government now allows a duration of ten years.

Apart from duration, the Government also restricts payments to the collaborator. Thus, the guideline is that royalties should not exceed 5% of the value of production, and this is subject to taxation at a rate of 50%, so that the foreign exchange payment is only 2½%. However, the Government permits a royalty premium of about 2% for export sales and permits significantly higher payments on more sophisticated machinery. Most machine tool manufacturers would like to be able to give royalties of up to 10 or 15%.

Moreover, restrictions on import content and requirements for progressively increasing the indigenous content restrict the value of components supplied by the collaborator.

A number of Indian machine tool manufacturers have argued that the collaboration terms allowed by the Indian Government are not as attractive as those given by other countries. They say that this is one reason Indian manufacturers do not get better designs.

Our basic recommendation with regard to foreign collaboration is that the Government follow a liberal policy in approving such agreements and should be flexible in allowing longer duration or higher royaltieis. India should not attempt to become self-sufficient in machine tool research and development. We cannot afford to indulge in what Professor Blackett calls, "the unnecessary waste of re-invention, rediscovery and re-development$^{(1)}$. As remarked by Sir James Lindsay, "We should be unwise to turn ourselves into a nation of Robinson Crusoes."$^{(1)}$ The cost of basic research and sophisticated areas of applied design makes it uneconomic for India to develop its own technology. Further, development of indigenous technology would require spending time that would only increase the gap between foreign and Indian manufacturers.

Other countries, like Japan, have relied and continue to rely on foreign collaboration.

The need for foreign collaboration and indigenous development of improved machine tools is based on considerations of the home market as well as the requirements for export. Because machine tools are the basic machinery for the engineering industires, the design of Indian machine tools will have an important effect on costs of production of engineering goods and the competitiveness of those goods in the export market. The significance of this latter point is brought out by the fact that the 1973-74 target for machine tools is Rs 7.5 crores as against a target of Rs 225 crores for the entire engineering industry.

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(1) Speech by Sir James Lindsay, Chairman, The Metal Box Company of India Limited, on "Foreign Collaboration" at the Indian Chamber of Commerce Conference in Calcutta with Shri R. Venkataraman, Industries Member, Planning Commission, on "Planning" - September 2, 1968.

The policy on foreign collaboration should also be viewed in the context of the need to think now of the export strategy for the Fifth Plan and beyond.

R & D and product development must be initiated now to prepare for the change in the market in the direction of N/C and other sophisticated machines because of the long lead time required for machine tools.

The achievement of this objectives will be materially assisted by facilitating foreign collaboration and technical know-how for the Indian machine tool industry. The optimum technical benefit from foreign collaborations will be derived by the Indian machine tool industry if the agreements are for a period of 10 to 15 years. A more liberal attitude with regard to insistence on local sub-licensing and export franchises will also facilitate technical cooperation from foreign collaborators.

The CMTI could be of major help to the industry in the area of long range product development. The R and D capability of the CMTI will need to be strenghthened if it is to play its role in assisting the industry. The CMTI should have a separate department for the design and development of N.C. machines in particular and sophisticated machines in general. The CMTI should have the benefit of foreign experts to train its personnel. Its own engineers should be sent abroad for foreign training. Finally, an information system must be devised to ensure that the CMTI receives export market reports from industry to guide product development to meet end user needs.

27. Packing

The primary object of good packing is to reach the consignment to the destination in sound condition. To ensure this, the packing should be sturdy and adequately protected for seaworthiness. Equally important is that its design be such that the gross weight and volume of the package are the minimum in order to cut down the incidence of freight.

Unfortunately, packaging is still one of the neglected aspects of our machine tool export. There have been a number of instances where Indian machine tools reached the consignee in damaged condition. In one extreme case, about 100 lathes had to be re-shipped to India due to extensive damage to their bases, presumably caused by defective packing. In contraast, a West German exporter employs such sturdy and expensive packing that he goes to the extent of collecting back the packing materials for reuse instead of having to collect back the damaged machine tools!

Sturdiness and seaworthiness are two major considerations in packing machine tools for export. Foreign exporters attach great importance to these aspects. For instance, in Czechoslovakia, the gross weight of the packages exported by Strojimport, indicate that the weight of packing materials in case of seaworthy packing is 3 to 5 times heavier than railway packing as shown in Table 8.

Table 8 - Railway Packing Vs Seaworthy Packing

Type & Model of Machine	Net weight of machine kg	Gross weight of machine with railway packing kg	Gross weight of machine with seaworthy packing kg
1) Radial drill VR-4 ..	2,550	2,680	3,320
2) Milling Machine FA4H ..	2,772	3,000	3,500
3) Slotting Machine HOV24	7,400	8,100	9,200

Besides the structural features which impart sturdiness to the package, other considerations such as protection against pilferage, weather, corrosion and biological hazards are also important. As there are no standards laid down for seaworthy packing of heavy machine tools, the general criterion of the suitability of the packing is its performance based on previous experience gained under actual conditions. However, for medium and light machinery, standards have been specified by some agencies. For instance, the Institute of Packaging, U.K., and the Export Inspection Council set up by the Government of India specify test schedules for vibration, impact, shower, humidity etc to evaluate package performance by simulating the punishments in the laboratory.

Machine tools by themselves are not in the danger of any biological attack, but the packing timber is susceptible to attack by vermins, such as termites, borers, etc. A few countries, notably Australia, insist on the use of packing timber treated against vermins. Machine tool exporters to Australia must take into account this specific requirement.

27.1 Typical Design for Packing

The development of suitable designs for packing machine tools is of great significance in the context of the industry's export efforts. As different machine tools have different configurations, obviously appropriate designs have to be evolved for each group of machine tools. To illustrate the main features, we have developed a typical seaworthy packing arrangement for a lathe bringing out the structural features and other protective requirements. This is shown in the following sketch.

27.2 Use of Steel Strapping to Reduce Gross Volume of Package

In designing the package, another major consideration should be to reduce the overall size of the packing to the minimum. This is very important because the ocean freight for machine tools is invariably charged on volume basis in view of its high stowage factor. The stowage factors of selected Indian machine tools are shown in Table 9.

Table 9 - Stowage Factors of Selected Indian Machine Tools

Type of Indian Machine Tool	Approx. stowage factor cu m/1000 kg
1) Shaping machines	2.00
2) Radial drill	2.86
3) Centre lathes	2.38 to 2.90
4) Turret lathes	3.01
5) Capstan lathes	4.46
6) Surface grinders	4.62
7) Knee type milling machine (mechanically controlled) ..	4.93

One possibility of achieving some reduction in the gross volume of a package is by the use of steel straps in place of the wooden battens. For example, by replacing 25 mm thick wooden battens by 3 mm thick steel strap, a reduction of 7.5% in the gross volume can be effected as shown in Table 10.

Table 10 - Possible Reduction in Cubic Content by Using Steel Strap

Type of Construction	Case dimensions for shipping L x B x H mm mm mm	Cubic content for shipping cu m
1) With 25 mm thick timber battens ..	2230 x 810 x 1320	2.384
2) With 3 mm thick steel strapping ..	2186 x 766 x 1298	2.173
Reduction in volume ..		0.211
		or 8.44%

Such a design using steel strapping will be particularly beneficial in cases where the incidence of ocean freight is high, and can result in a saving of 1.5 to 2.3% of FOB value. Taking the case of shipment of a centre lathe from Bombay to the Canadian Atlantic Coast, the saving in ocean freight would amount to about 1.88% of the FOB value, as shown in Table 11.

Table 11 - Saving in Freight by Using Steel Strapping for Packing

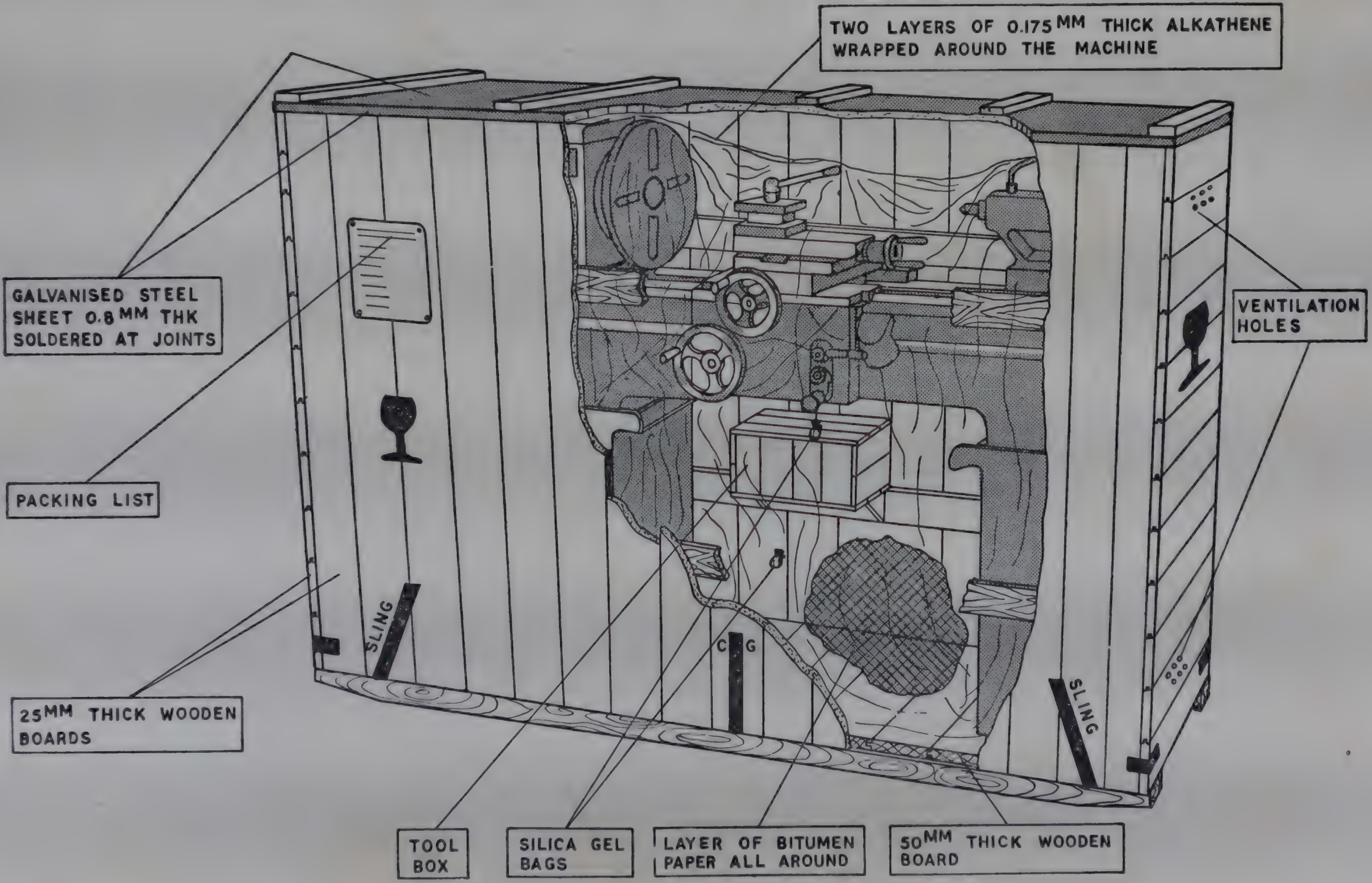
	FOB value of machine $	Shipping volume cu m	Ocean freight rate per cu m $	Total ocean freight/machine $
Machine Tool (Centre Lathe)				
i) with battened packing ..	762	2.384	82.34	196.30
ii) with strapped packing ..	762	2.173	82.34	178.93
Saving in ocean freight ..				$ 17.37 or

2.28% of FOB value of $ 762.

(In this example, the ocean freight includes Cape diversion surcharge).

TYPICAL SEAWORTHY PACKING FOR A CENTRE LATHE

(BRACING MEMBERS & ANTI-CRUSH STRETCHER BARS HAVE NOT BEEN SHOWN FOR CLARITY)


TWO LAYERS OF 0.175 MM THICK ALKATHENE WRAPPED AROUND THE MACHINE
GALVANISED STEEL SHEET 0.8 MM THK SOLDERED AT JOINTS
VENTILATION HOLES
PACKING LIST
SLING
C G
SLING
25 MM THICK WOODEN BOARDS
TOOL BOX
SILICA GEL BAGS
LAYER OF BITUMEN PAPER ALL AROUND
50 MM THICK WOODEN BOARD

27.3 Multiple Packages to Reduce Gross Volume

Another technique of packing which can be advantageously employed is multiple packages instead of single package, particularly in case of machine tools which occupy large volume on account of their peculiar configuration. Take the case of radial drills, for instance. Here a reduction of 20 to 40 per cent in the total cubic content of the package can be achieved as shown in Table 12 by packing it in a partially knocked-down condition, namely, packing the motor, arm and sleeve separately, instead of packing the entire machine in one case.

Table 12 - Reduction in Cubic Content by Packing in Two Units Instead of One
(Radial drills) (3 types)

Single Case		Two Cases		
Cubic content	Total surface area(1)	Cubic content	Total surface area(1)	Reduction in cubic content
cu m	sq m	cu m	sq m	%
8.22	26.12	6.57	27.24	20
13.90	34.28	8.18	33.38	41
19.26	46.16	12.53	44.06	35

Note:
(1) The surface area being more or less the same in both cases, the quantity of packing material required and hence its cost would also be same.

A reduction of this order in the cubic content would mean a saving in ocean freight equivalent to 3 to 6 per cent of the FOB value of the machine tool when the freight incidence is over 15 per cent of the FOB value of the machine tool. Assuming FOB price of $ 3,500 for a radial drill, the saving at 5% would be $ 175. Against this saving, the cost of assembling at the receiving end will have to be taken into account.

27.4 Handicaps of Indian Exporter in Respect of Packing

It is germane here to discuss at this point some of the difficulties which the Indian machine tool exporter has to face compared to his overseas competitor in regard to packing.

Due to the limited availability of suitable coniferous wood, the Indian machine tool exporter is somewhat handicapped as he has to use harder and denser species of timber at times with poor nail holding capacity. The weight of packing materials will be 50 to 70% more than that of his competitor in other countries, due to the denser wood used. As a direct consequence, the Indian exporter has to bear additional freight cost to the extent of 0.25 to 0.75% of the FOB value to important destinations. To illustrate, taking the example of the radial drill considered earlier, for shipment from Bombay to Australia, the additional heavy lift charge (an element in ocean freight) payable while using denser timber for packing works out to $ 24.3 as shown in Table 13. The incidence of this additional freight cost corresponds to 0.7% of the FOB cost of the machine estimated at $ 3,500.

Table 13 - Difference in Heavy Lift Charge due to use of Different Types of Wood for Packing Case

Type of timber for packing	Density of timber kg/cum	Net wt. of machine kg	Weight of packing kg	Gross wt of package kg	Gross volume of package cu m	Heavy lift rate $/cum	Heavy lift charge $
Broad-leaved white cedar	770	2,600	1,000	3,600	13.90	5.25	73.0
Coniferous (Pine)	480	2,600	630	3,230	13.90	3.50	48.7 24.3
Increase in heavy lift charge				..		..	24.3

Note:
(1) The heavy lift rate in the weight slab of 2,501 to 3,500 kg is $ 3.5 per cu m. In the next higher slab from 3,501 to 4,500 kg, it increases to $ 5.25 per cu m which is applicable to the entire cubic content of the package.

In regard to the other packing materials such as galvanised iron sheets and polythene sheets, the costs are higher in India than those obtaining in other machine tool exporting countries such as Japan, UK, and USA - galvanised iron sheets are 60% more expensive, and polythene sheets are 3 times more expensive after crediting the drawback of excise duties. These naturally add to the packing costs of the Indian exporter.

Another handicap faced by the Indian exporter is in respect of rust preventives. The types of corrosion inhibitors produced and marketed in India are not the best suited for this purpose. Thus for instance the rust preventive TCPF 60 produced by Burmah-Shell in India is found to give insufficient protection even with a four-coat application, on account of its low viscosity. The other rust preventive ENSSIS 356 (of Burmah-Shell) would be suitable but is not available in India.

27.5 Recommendations on Packing

(1) Appropriate designs for seaworthy packing cases incorporating necessary structural features and protective requirements should be evolved for different groups of machine tools. A typical arrangement has been indicated in this study. The Indian Institute of Packaging should assist the machine tool manufacturers in developing the designs.

(2) The Indian Institute of Packaging should study and evolve standards for seaworthy packing of Indian machine tools for export.

(3) The machine tool exporter should examine the possibility of using steel strap instead of thick wooden battens in packing cases. The example considered in this study indicates a 8.44 per cent reduction in the gross volume of the package and consequent saving in freight equal to 2.28% of the FOB value of the machine tool.

(4) The exporters should investigate in specific cases the economics of packing the machine tool in two cases after partly knocking down, instead of packing the entire machine in one case and then reassembling at the destination. The particular exercise in this study indicates that the total volume of the two packages is 20 to 40% less than the gross volume of a single package, which in turn would result in a substantial reduction in ocean freight equivalent to 3 to 6% of the FOB value of the machine tool. Against this saving, the cost of assembly at the destination should be examined by the exporters.

(5) Government should consider supply of galvanised iron sheets and other protective materials such as polythene sheets at international prices to exporters.

(6) Government should liberalise import of rust preventives required by machine tool exporters.

28. Inland Transport

Coming to inland transport, the vastness of the country and the location of many of the machine tool factories in the interior, and the consequent long haulages from the factories to the port, place the Indian exporter again at a disadvantage. For instance, a consignment from HMT, Bangalore, has to travel over a distance of 1,027 km by road to Bombay as there are very few sailings from Madras. From Batala, Punjab, the lead to Bombay is about 1,905 km, and from Chandigarh to Bombay it is 1,744 km. As against this, machine tool exporters in foreign countries are in an advantageous position, for the inland transport lead in countries like Japan, U.K., and West Germany is much less, from 100 to 300 km. Due to the long lead as well as the high tax rates on motor vehicles in India, the incidence of inland transport alone is reported to be over 5% of FOB value in some cases as compared to under 1% in the countries mentioned above.

The lead by road from the Punjab area to Kandla port is 250 to 300 km less than that to Bombay. Speedy completion of the development of Kandala port and its communications with the hinterland would enable more export through this port. The machine tool exporter will then be able to cut down the road transport cost by about $ 7 per ton. Similarly, if the Marmugao port can be developed to handle more general cargo liners (presently the traffic is largely in bulk carriers), the machine tool exporters from Harihar & Hubli would be able to reduce the road transport cost by about $ 8 per ton as the lead to Marmugao port will be about 425 km less than the distance to Bombay.

28.1 Problems of Railway Transport

It would be worthwhile examining why Indian exporters of machine tools should resort to the more expensive road transport instead of taking full advantage of concessions offered by railways on export cargo. The difficulties encountered with rail transport such as long delivery time, uncertainty in getting wagon allotment, stipulations in regard to minimum load for wagon, difficulties in arranging cranes for loading and unloading, break of gauge, problems in handling over-size consignment, and procedural and operational delays are some of the factors that have weighed with Indian exporters in their marked preference for road transport. This is in tune with the modern trend in many other countries. In U.K., movement of export cargo is mainly by road for distances of less than 160 km to the port, in USA up to 480 km and in Sweden up to 500 km.

Another factor that has gone against rail transport is the long time taken to reach the cargo to the port. Even for wagons moving under export priority labels, the transit time is about 26 days from Bangalore to Bombay and 19 days from Bangalore to Madras. In contrast, road journeys to Bombay and Madras from Bangalore are completed within

72 hours and 24 hours respectively. Due to the inordinate delay in rail transport, sailings are often missed involving additional expense for storage and handling, and the exporter cannot meet his delivery schedule.

A comparison made of rail and road costs for selected cases indicates that over long distances, road transport cost is 2 to 3 times that of the railway freight as shown in Table 14.

Table 14 - Comparative Freights by Road and Railway

Despatching centre	Port of shipment	Distance		Freight		
					By rail(2)	
		By road km	By rail km	By road(1) Rs/ton	Smalls Rs/ton	Wagon load(3) Rs/ton
Harihar	Bombay	748	558	150 (19.94)	70 (9.32)	143 (19)
Bangalore	Bombay	1,027	1110	205 (27.4)	110 (14.65)	263 (35)
Chandigarh	Bombay	1,744	1631	331 (44.2)	121 (16.10)	299 (39.8)

Figures in brackets indicate freight in $ per ton.

Notes:

(1) By road, an average of 60 paise/truck km, for over 600 km assumed and the average load of truck with machine tool cases taken as 3 tons.

(2) Concessional freight rates assumed; trucking expenses from factory to the despatching station and the receiving station to the dock area at the rate of Rs 8/ton ($ 1.07/metric ton) at either end have been included. Railway crane hire charges at the despatching as well as receiving station at the rate of Rs 6/ton ($ 0.8 per metric ton) have been considered.

(3) Load availability on average taken at 3 tons per wagon.

It should be noted that the disparity between the freights by road and rail would further increase if we are to assume loads of 4½ tons per wagon for M.G. and 5½ tons of B.G. railways which are the minimum chargeable loads for carriage at wagon load rate. It is frustrating to the exporter to get penalised by the high cost of road transport in return for his efforts to move his consignment fast for meeting his delivery schedule.

28.2 Road Transport Cost Very High in India

An examination of this high cost reveals that a major factor is the heavy incidence of taxes, and the additional expenses incurred by the road transport operators on the maintenance and operation of vehicles directly resulting from the poor condition of the roads in the country. Among the basic industries in India, the total incidence of taxation and other levies expressed as a percentage of the turnover is one of the highest on the road transport, and is next only to that on electricity generation and supply, and cement as shown by a survey undertaken by the Reserve Bank of India in 1964-65 which is summarised in Table 15.

Table 15 - Incidence of Taxes & Other Levies on Some Basic Industries in India

Industry	Sum of excise duties, cess & provision for income tax as percentage of turnover(1) %
Electricity generation & supply	28
Cement	26
Road transport	22
Railways	0
Coastal shipping	8
Maritime shipping	1
Transport equipment	12

Source: "Finances of Indian Joint Stock Companies, 1964-65", Reserve Bank of India Bulletin, Nov. 1966.

Note:
(1) Exclude taxes collected by State Governments and local bodies.

The Road Transport Taxation Enquiry Committee (Keskar Committee) has estimated that the annual tax element in the case of operation of a 9-ton goods vehicle in 1966 amounted to 35.2% of the total cost of operation. This conforms with the 1966 estimates of the Indian Roads and Transport Development Association (IRTDA) which has come out with a figure of 6.83 paise (0.91 Cent) as the tax element on a total operating cost of 19.11 paise (2.55 Cents) per ton mile including the tax element. Since then the taxes have further gone up. Besides, on the basis of surveys conducted by the Indian Roads Congress, it has been estimated that on account of the poor condition of roads, the vehicle operator in India incurs additional expenditure of about 17% of the total operating expenses. Thus, it will be seen that over 50% of the road transport cost is accounted for by taxes and incidental expenses beyond the control of the road transport operator. It is, therefore, suggested that on export consignments from the factory to the port, the exporter be given a drawback as a percentage of the road transport freight paid by him subject to a ceiling per ton-km.

28.3 Truck-Trailer Combination

It is known that truck-trailer combinations even in smaller capacities upto 18 tons would result in specific reduction of 40 to 50 per cent in the operating cost of road transport, as shown by a survey conducted by the Washington State Highways Department.

Truck-Trailer capacity. tons		Reduction in operating cost %
13.5	..	40
18.0	..	47
22.5	..	66
27.0	..	72
32.0	..	77

In view of the high volume content of the gross package of the machine tools, the present system of transport in trucks is not able to fully take advantage of the pay-load capacity of the truck. Truck-trailer combinations would be advantageous in this respect and initially the possibility of using smaller capacity trailers for this purpose should be tried out and the economics and related factors should be studied.

28.4 Octroi Duty

Besides the heavy road transport freight, another imposition is by way of octroi duty which is currently 1% ad valorem on machine tools entering Bombay city. However, in case of exports refund of octroi duty is permitted, provided there is no change of title of the consignor. For example, if a machine tool is brought to Bombay city from Traub India, Poona, an octroi of 1% is levied on entry but this cotroi is refundable when the machine tool is exported directly in the name of Traub. However, if Traub India in the first instance sells this machine to an export house like Voltas, Bombay, who in turn export it, Voltas are not entitled to this refund under the present law. On the other hand the Maharashtra state sales tax laws permit refund of tax up to two changes of title before shipment. Therefore, it is suggested that the octroi laws also be brought in line with the sales tax laws permitting refund up to 2 changes of title.

28.5 Multiple Handling of Machine Tools at Ports

Another point at which the machine tool exporter in India has to bear additional charges is at the port arising out of multiple handling of the cargo. Generally, the truck on reaching the port area has to unload the package outside in a private warehouse pending allotment of berth by the scheduled sailing. A crane has to be hired for this unloading operation. On allotment of a specific berth for the ship, the consignment has to be moved from the warehouse to the transit shed or wharf inside the dock area, for which a second hiring of crane is necessary. On arrival of the ship the cargo has to be moved along the wharf before loading into a particular hatch of the ship by the stevedores. Thus there are two to three separate handlings involved for each consignment each of which necessitates use of a crane for which the current hire charges quoted by private agencies are of the order of Rs 90 ($ 12) per hour which is the minimum unit time. The total charges for the three hirings of cranes would be Rs 270 ($ 36). Assuming load availability of 3 tons, this would work out to Rs 90 ($ 12) per ton.

As against this, in foreign ports, the procedures and operations are such that generally only one handling has to be paid for by the exporter. In view of the extra expenditure and time involved, it is suggested that the port authorities in cooperation with customs and other agencies concerned, streamline the procedures, particularly for heavy lift cargoes so that a shipper is not called upon to bear the additional burden of paying for more than one handling. If this suggestion were to be implemented, a saving of about Rs 60 ($ 8) per ton can be effected which is equivalent to approximately 0.8% of the FOB value.

28.6 Recommendations on Inland Transport

(1) Government should take speedy measures to complete the development of Kandla port and link it adequately with the hinterland. This will induce general cargo liners to call more regularly at the port. Exports, including machine tools, will then increase through this port. In that case, the load from machine tool factories, located at Batala, Pinjore, Delhi and other places in the North-western region would be reduced by 250 to 300 km, resulting in a saving of $ 7 per ton equivalent to about .7% of the FOB value of the machine tool.

(2) Similarly, if it is possible to develop Goa as a general cargo port (most of the traffic currently is in bulk carriers), the lead from the machine tool factories at Harihar and Hubli will get reduced by about 425 km giving a saving of $ 6 per ton. This

possibility should also be considered by Government.

(3) It is recommended that the exporter be given a drawback as a percentage of the road transport freight paid by him (subject to a ceiling per ton-km) from factory to the port on export consignments of machine tools. This is because the road transport cost in India is very high primarily due to the heavy incidence of taxes and incidentals (over 50% of the transport cost) beyond the control of the operator.

(4) Octroi laws should be brought in line with Sales tax laws permitting refund of octroi duty up to two changes of title on exports.

(5) Port authorities should streamline procedures to avoid multiple handling of machine tool packages for export. According to present practice the exporter has to hire crane on two to three occasions in the port area. This can be reduced to only one, in which case the exporter can bring down the crane charge by $ 8 per ton.

29. Ocean Freight

Lastly, the continuing rise in ocean freights and discrimination pose a serious threat to our export efforts. This has been confirmed by the findings of a recent survey conducted by the Indian

Machine Tool Manufacturers' Association on the export problems of manufacturers, which has revealed that a major difficulty is the high incidence of freight.

The major elements that constitute the ocean freight are:

i) basic freight rate,
ii) heavy lift rate,
iii) cape diversion surcharge, due to closure of Suez canal,
iv) immediate or deferred rebate,
v) special surcharges for transhipment, port congestion, harbour dues, etc.

29.1 Incidence of Freight

The FOB value of Indian machine tools when shipped with electricals is estimated to be by and large in the range of $ 300 to $ 400 per cu m of the gross package volume. The incidence of freight on this FOB value is as high as 28% to USA and Canada which are our first priority markets. Table 16 shows the freight incidence to selected destinations.

While no internationally accepted standard has been evolved for determining the equitable level of freight incidence, a measure of this equity is discernible in the tariffs in the form of ad valorem rates stipulated for general cargo items which lie within a range of 3 to 6 per cent. As against this, it would be seen from the table that the freight incidence on our machine tool exports to potential markets varies from 5 to 28 per cent which calls for a close scrutiny and investigation into the freight structure.

Table 16 - Incidence of Freight to Selected Destinations

Destination	Incidence of Ocean Freight on FOB value for Low-priced machine tools up to $ 400 FOB value/cu m %	Incidence of Ocean Freight on FOB value for Medium-priced machine tools over $ 400 FOB value/cu m %
U.S.A. Atlantic Coast and Gulf of Mexico Ports ..	20 to 27	13 to 20
Canadian Atlantic Coast	21 to 28	14 to 20
U.S.A. and Canadian Pacific Ports ..	15 to 20	10 to 13
New Zealand ..	11 to 14	7 to 10
Australia ..	8 to 13	5 to 9
U.K./Continent ..	8 to 10	5 to 7
Far East (Except Malayasia) ..	10 to 17	6 to 9

Notes:

(1) Dual system of freights, viz., contract and non-contract is in vogue on trade routes to the U.S.A. Atlantic Coast and the Canadian Atlantic Coast. The contract rate is about 10% lower than the non-contract rate and for the purpose of evaluating the incidence, only contract rates have been considered.

(2) On a few other routes to U.K./Continent and Far East the rates quoted are gross and subject to deferred rebate of 10%. Full credit has been taken for this rebate in the calculations.

29.2 Frequent Freight Escalations

An analysis of the freight structure reveals a number of factors contributing towards this high incidence. A most disturbing phenomenon is the frequent freight escalations particularly on routes to developed countries. Escalations on some of these routes during the 5-year period from 1964 to 1969 show an aggregate increase ranging from 24 to 46 per cent as shown in **Table 17.**

Table 17 - Ocean Freight Escalations During 1964-69

Trade Route	Date of first escalation	Date of latest escalation	Aggregate(1) increase in freight %	Avg.rate of(1) freight escalation/annum %	Avg. annual rise in the incidence of freight on FOB value of machine tools % of FOB Value
West Coast of India/USA Atlantic coast & Gulf of Mexico ports	15.3.64	11.1.69	46.4	9.15	1.65
West Coast of India/Canada	1. 2.65	1. 4.69	33.1	6.62	1.24
West Coast of India/USA & Canadian Pacific ports	1.11.65	20.3.69	33.1	6.62	0.90
India/New Zealand	1. 3.64	15.9.67	27.2	5.44	0.57
India/Australia	1. 3.64	1.11.67	24.2	4.84	0.43

Notes:
(1) All increases are shown as percentage of the base figure on 29.2.64

It is seen that the highest freight increase has taken place on the route from West Coast of India to USA Atlantic Coast and Gulf of Mexico Ports. The average annual rate of rise works out to 1.65% of the FOB value. This rate of rise, if allowed to continue, will completely wipe out in the next 3 years the benefits to exporters from the Kennedy round tariff reduction from 12½% tapering off to 7½% by 1972.

29.3 General Cargo Rates Applied to Machine Tools

Secondly, on a large number of routes, general cargo rates are applied to machine tool exports. The general cargo rates, in tariffs of developing countries, are invariably on the high side on account of the indeterminate character of the cargo. Hence it is a normal practice to fix separate rates which are lower than the general cargo rates for selected items of machinery, machine tools, etc. Out of about 45 conference/shipping lines which operate India's overseas trade, it is noticed that on 24 routes no separate or differential rates for items of machinery or machine tools have been established. In these 24, are included 5 routes for the first priority export markets for machine tools, namely, Canada, USA, and Australia. The current basic freight rates on these 5 routes are shown in **Table 18.** The rates to UK/Continent and USA Atlantic coast have also been included in this table to illustrate the differentiation between specific rates for machine tools and general cargo, the rates for former being about 42 and 16 per cent lower on UK/Continent and USA Atlantic coast routes respectively.

Table 18 - Current Basic Freight Rates to Selected Destinations

Port of Despatch		Port of destination	General Cargo $/cu m	Machinery not otherwise specified $/ cu m	Machine tools $/cu m
India	..	UK/Continent	40.50	29.35	-
West Coast of India	..	USA (Atlantic coast)	75.75	67.50	67.50(1)
Madras	..	Canadian Atlantic coast	84.00	-	55.25
Bombay	..	Canadian Atlantic coast	71.60	-	-
Cochin	..	Canadian Atlantic coast	71.60	-	-
Bombay	..	Australia	30.50	-	30.50
Madras	..	Australia	36.42	-	-

Note:
(1) This is the regular rate. Emergency rate of $ 58.00 per cu m has been fixed, the validity of which expires on 30th April 1969.

29.4 Anomalies in Freight Rates

Thirdly, outbound tariffs from India show discrepancies in the freight rates. Though many of the far-east ports are on the India-Japan route, the freight rates from Indian ports to some of these ports are disproportionate to those prevailing between India/Japan. For instance, the freight rate from Cochin to Bangkok is $ 34.3 per cu m after excluding the transhipment charge whereas the freight from Cochin to Japan is only $ 34.55 per cu m inspite of the distance to Japan being almost double. Table 19 shows such discrepancies.

Table 19 - Freight Rates on Machine Tools to Far East

Port of Despatch	Post of Destination	Transhipment at	Freight $/cu m	Estimated Transhipment charge(1) $/cu m	Freight excl Transhipment $/cu m
Bombay	Bangkok	Singapore	32.20	3.60	28.60
Cochin	Bangkok	Singapore	37.90	3.60	34.30
Bombay	Saigon Pnompeh	Singapore	38.35	3.60	34.75
Cochin	Saigon Pnompeh	Singapore	42.00	3.60	38.40
Bombay	Keelung Kaoshing	Hongkong	35.55	3.60	31.95
Cochin	Hongkong				24.60
Bombay	Main Japanese ports				33.80
Cochin	Main Japanese ports				34.55

Note:
(1) The estimated transhipment charges are the maximum ones collected on Calcutta/Australia and Calcutta/New Zealand routes for transhipment at Singapore of goods from shippers in Madras.

Fourthly, the Indian exporters have to bear higher heavy lift charges. India/UK Continent freight rate tariff was amended in April 1968 to raise the exemption limit on heavy lift charges from 2,032 kg (2 long tons) to 5,000kg. But, on routes leading to USA and Canadian

Atlantic and Pacific coasts from India, the scale of heavy lift charges still starts from 2,032 kg, for which there is no justification as the ports of USA and to a lesser extent those of Canada are even better equipped than the UK/Continent ports for handling heavy loads.

Another anomaly that is noticeable is that the freight rate, say on Bombay/New York direct route is higher than the total of the devious route from Bombay to London and London to New York as shown below:

	Route		Freight including heavy lift charges $/cu m
1)	Bombay/London	..	26.42
	London/New York	..	38.88
			65.30
	Bombay/New York (direct route)	..	66.20
2)	Bombay/London	..	26.42
	London/Canada Atlantic coast	..	39.40
			65.82
	Bombay/Canada Atlantic coast (direct route)	..	73.45

29.5 Discrimination

Fifthly, the basic freight rate on outbond tariffs on some trade routes of India are higher than those on the corresponding inbound tariffs as shown in Table 20.

Table 20 - Discrimination in Inbound & Outbound Tariffs

Commodity	W.Coast India/USA & Canadian Pacific		E.Coast India/USA & Canadian Pacific		Bombay/Japan	
	Outbound $/cu m	Inbound $/cu m	Outbound $/cu m	Inbound $/cu m	Outbound $/cu m	Inbound $/cu m
Machine tools	-	-	-	-	34.55	19.85(1)
Machinery not otherwise specified	61.50(2)	55.25	-	-	33.80	23.45
General cargo	70.00	62.50	69.85	62.50	34.55	23.45

Notes:

(1) This rate applies to second-hand machine tools only; new machine tools are freighted under the category of 'Machinery not otherwise specified.'

(2) This rate has been recently reduced in 1968 to $ 47.50 by Indian shipping lines only.

(3) The general cargo rates have also been included for comparison as they form one of the indicators of the level of freight structure on a particular route.

Similarly, while no heavy lift charge is levied in inbound tariff on packages up to 4,000 kg, this charge is made in outbound tariffs on some trade routes of India as shown in Table 21 on next page. Such discriminatory rates specially in the export trade of a developing country like India to developed countries make her product non-competitive in the export market.

Further, after the closure of the Suez Canal, Indian exporters have to bear in addition the Cape diversion surcharge of 15% as against corresponding rates of 5% on UK/Australia route and 10% on Japan and Far East/UK Continent route.

Table 21 - Heavy Lift Rates in Outbound Tariff on Some Important Routes(1)

Port of despatch	Port of destination	Above 1500 and up to 2000 kg $/cu m	Above 2000 and up to 2500 kg $/cu m	Above 2500 and up to 3000 kg $/cu m	Above 3000 and up to 3500 kg $/cu m	Above 3500 and up to 4000 kg $/cu m
West Coast of India	USA and Canadian Pacific ports	nil	2.15	2.15	2.70	3.25
East Coast of India	USA and Canadian Pacific ports	nil	2.00	2.00	2.50	3.00
Bombay, Malabar Coast, Calcutta & Madras	Canadian Atlantic ports	nil	2.05	2.05	2.55	3.06
Bombay & Malabar Coast	Australia	1.75	1.75	3.50	3.50	5.25

Note:

(1) All rates shown are only in outbound tariff as there is no heavy lift charge in inbound tariff except on the Australian route. In the inbound tariff from Australia heavy lift rate is $ 9.42 per 1000 kg on packages in the weight range of 3001 to 4000 kg which works out to an equivalent rate of $ 3.37 per cubic metre, assuming a stowage factor of 2.8 cu m per 1000 kg.

Table 22 illustrates the disadvantage of the Indian machine tool exporter in regard to the ocean freight vis-a-vis his competitors from a few selected countries.

Table 22 - Comparison of Freights on Machine Tools from Selected Countries(1)

Port of Despatch Destination	Net Ocean Freight Rate on Machine Tools				
	Bombay $/cu m	U.K. $/cu m	Japan $/cu m	W.Germany $/cu m	Yugoslavia $/cu m
Thailand (Bangkok)	33.85	34.83	22.75	-	44.05
South Vietnam (Saigon) ..	57.45	58.07	-	-	-
Australia ..	34.00	42.70	35.00	-	-
New Zealand ..	41.04(2)	40.90	37.60	-	-
Philippines ..	36.05	33.20	21.00	-	-
USA Atlantic coast	66.20	38.88	49.60	36.00(3) +21.00	46.50
U.K./Continent ..	26.42	8.64(4)	35.20	-	-
Japan ..	34.45	34.38	-	34.33	-
USA Pacific coast	50.00	53.80	40.60	75.50	61.00
Canada Atlantic coast ..	73.45	39.40	53.80	52.00	-

Notes:

(1) The weight range selected from India is between 2000 and 2500 kg for heavy lift charge. All freight rates are net after crediting deferred rebates wherever applicable. Cape diversion surcharge due to closure of Suez canal has been excluded.

(2) The rate includes $ 3.60 per freight ton for transhipment at Singapore

(3) 6% ad valorem value has been converted to US Dollars taking FOB value at $ 350 per cu m

(4) The rate is for Rotterdam and quoted on weight basis only. It has been converted to volume basis assuming stowage factor of 2.8 cu m/1000 kg.

From this table, it would be clear that countries like Japan, West Germany, U.K. and Czechoslovakia (through Yugoslavia) who are our major competitors in the machine tool trade enjoy substantial freight advantage to first-priority markets. For instance, while the freight from India to the USA Atlantic coast works out to $ 66.2/cu m, Japan has to bear only $ 49.6 and U.K. $ 38.88. Similarly, though New Zealand and Saigon are geographically closer to India than U.K., India does not have any freight advantage over U.K. to these distinations.

29.6 Low Sales Realisation of Indian Exports

The Freight Investigation Bureau should examine these anomalies and discrimination and pursuade the conference/shipping lines to correct them. This initial corrective action will no doubt help in achieving some measure of parity rates. For instance, the present basic freight rate of $ 63.75 per cu m from West Coast of India to the USA Atlantic coast would come down to the level of $ 47.7 per cu m from Japan or even less. Even after achieving this parity rate, the incidence of freight on machine tool shipments would still be disproportionately high compared to the foreign exporter. This is because the net FOB realisation by the Indian shipper is less than half of that of his foreign counterpart though the gross volume of package/stowage condition remains more or less equal in both cases. This is illustrated by the following exercise shown in Table 23.

Table 23 - Comparison of FOB Values Realised

Particulars	U.K. Competitor		Indian Exporter	
	Rs		Rs	
Price of machine to US end user (Indian machine priced after discount of 20%)	-	22,686	-	18,149
Normal commission to distributor ..	5,731	-	5,731	-
Additional commission on Indian machine tool @ 20% of normal commission..	-	-	1,145	-
CIF duty-paid price ..	-	16,955	-	11,273
Tariff @ 12.5% ..	1,884	-	1,253	-
CIF Price of machine ..	-	15,071	-	10,020
Freight and insurance ..	1,300	-	2,280	-
FOB Price of Machine ..	-	13,771 (100%)	-	7,740 (56%)
Adjustment for exclusion of electrical parts at 12½% of FOB value(1) ..	nil	-	-965	-
Adjustment for extra accessories at 10% of FOB value(2) ..	+1,375	-	nil	-
Final FOB value of Package..	-	15,146 (100%)	-	6,785 (44.5%)

Notes:

(1) Indian electricals do not generally find favour with foreign end users.

(2) Orders for machine tools received by Indian exporters usually exclude accessories as the foreign end-users are accustomed to getting them from established manufacturers of developed countries.

It will be noted from the above comparison, that the FOB value of the Indian machine tool is about 56% of that of the foreign machine. However, the shipping freight is largely governed by cubic content of the package on cargos like machine tool with high stowage factor. Though the volume of package is equal in both cases, the value of the contents in the Indian package is only 44.5% of that of his foreign competitor.

39.7 Need for Promotional Rates

In view of this large difference in the FOB values of packages from India and competing countries, parity rates should be further reduced to 44.5% to ensure parity of incidence of freight (expressed as a percentage of the FOB value) with the competing countries, in keeping with the universally recognised principle in shipping practice to fix freight rate according to the capacity of the cargo to bear it. In other words, if a foreign exporter pays a total freight of say $ 100 on a package having FOB value of $ 1,000, the freight to be paid by the Indian exporter should work out to $ 44.5 as his FOB value is only $ 445 for the same size of package. Such concession can be said to be in the nature of a promotional rate.

Reduction on freights in the past by granting of such promotional rates on engineering goods like cast iron pipes, manhole covers, Godrej safes, transmission line towers, etc have boosted up Indian exports. A few typical cases of such freight concessions are summarised in Table 24, and these could be extended to machine tools also for stimulating their exports.

Table 24 - Freight Reductions on Selected Engineering Goods

		Rate Reduced		Freight rate basis
Engineering Goods	Trade Routes	From	To	
Instances of Reduction of High Rates				
Steel storewell K/D cupboards - stowage factor about 3 cu m per 1,000 kg	Bombay/Port of Spain	$ 33.00(1) per cu m	$ 59.50 per 1000 kg	1,000 kg
Manhole covers	Madras/USA Pacific ports	$ 90.75	$ 21.75	1,000 kg
Bicycle rims	Cochin/USA Atlantic ports	$ 59.25(2) $ 82.50(2)	$ 30.00 $ 30.00	cu m 1,000 kg
Instances of Correction of Discriminatory Rates				
Steel bars, rounds, etc.	Calcutta/ Persian Gulf	Rs 120.00(3) nett	Rs 88.00	1,000 kg
Instances of Promotional Rates				
Bicycles and components in cases (about 6 cycles in knocked down condition occupy cu m of space)	Bombay/Canada	Sh.333/6(4) Sh.393/6(4)	Sh.259/- Sh.283/-	cu m 1,000 kg
Electric fans	Calcutta/ Australia	Sh.288/6(2) Sh.266/8(2)	Sh.216/6 Sh.155/-	1,000 kg cu m
Centrifugal pumps	Bombay/U.K. Continent	Sh.197/6(5)	Sh.160/-	cu m

Notes:

(1) Freight incidence was about $ 99 ($ 33 x 3 cu m) per 1,000 kg.

(2) General cargo rate as applied originally.

(3) The rate from Calcutta to Kuwait was Sh. 180 whereas from U.K. to Kuwait was only Sh. 108, though distances are about the same - hence, this has been reduced.

(4) Found place in the tariff as a "paper rate" only as bicycles had not moved on this route before in sizable quantities.

(5) "Machinery n.o.e." rate as applied originally.

29.8 Adjustment for Cost of Carriage

However, in evolving promotional rates, it needs to be ensured that the freight rates do not fall below the cost of carriage which differs on routes between developed countries, and between developed and developing countries like India. The annual average cost of carriage for 1967 on India/UK-Continent route before the closure of Suez canal for a shipping company was as shown in Table 25.

Table 25 - Composition of Voyage Cost

Sl No	Item of Expenditure	For voyages between India & UK/Continent %
1)	Brokerage, commission and agent fees @ 8% of earnings	8
2)	Stevedoring	24 (18 to 35)
3)	Port charges and dues	6 (4.5 to 10)
4)	Bunkering	6 (5 to 8)
5)	Expenses like transhipment, Suez canal tools etc	3
6)	Fixed charges	47
7)	Repairs and overhauls	6 (6 to 8)
	Total	100

Taking these actual figures as the basis for evolving a comparison of earnings on routes between developed countries, a broad analysis given in the Table 26 indicates that the net earnings of shipping companies on voyages between developed countries would be higher by about 20 per cent per voyage than those on routes to developing countries at the same level of freight structure, on account of higher volume of traffic and quicker turnround of vessels at ports.

Table 26 - Estimated Relative Earnings of Voyages Between Developed Countries

(Base = 100 per cent for voyages between developed and developing countries)

Budget Item	Variable item in comparison to that between developing countries	Relative earning %
Outgoings	Adjustment for higher stevedoring expenses, port dues and repair and overhauls (1)	-7
Earnings	i) Due to higher volume of traffic (particularly high-freighted cargo) per sailing by about 25 per cent $32^{(2)} + 1.25 \times (100-32) - 100$	+17
	ii) Due to higher turnover by about 15 per cent on account of speedy turnround of vessels at ports $\frac{15}{100}(100 + 17 - 7) \times .6^{(3)}$	+10
	∴ Net increase in earnings per voyage	+20

Notes:

(1) As the port dues in a majority of developed countries are higher than those at the Indian ports and the stevedoring as well as repairs and overhauls are more expensive in those countries on account of higher labour wages, the voyage cost between developed countries is estimated to be higher by about 7 per cent.

(2) Represents brokerage, commission, agents' fees and stevedoring expenses which increase in direct proportion with the volume of traffic and hence do not add to earning.

(3) Represents fixed charges repairs and overhauls and port dues @ approximately 60 per cent of the cost of the voyage.

29.9 Rationalisation of Freight Rate

The above aspect of cost carriage should also be taken into account in evolving a rational freight structure to promote exports. The following exercise shown in Table 27 with regard to West Coast of India/ USA Atlantic coast route illustrates a logical approach to such rationalisation.

Table 27 - Rationalisation of Freight Rates for Machine Tools

Sl. No.	Steps	Basic		Heavy lift charges	
		$/1000 kg	$/cu m	Weight range	$/cu m
1)	Current tariff from Bombay .. to USA Atlantic coast (Distance via Suez - 8196 nautical miles)	71.25	67.50	2,031-3,000	2.40
				3,001-3,500	3.05
				3,501-4,000	3.65
				4,001-4,500	4.25
				4,501-5,000	4.85
2)	Current tariff from Japan to USA Atlantic coast:				
	i) FOB value upto $ 500 per freight ton(1)	59.50	47.70	3,531-4,536	11.3/1000 kg
	ii) FOB value exceeding $ 500/freight ton(1)	81.50	65.40	4,537-5,440	13.6/1000 kg
	(Distance - 9,700 nautical miles)				
3)	i) Equitable rate from Bombay(2)				
	a) FOB value upto $ 450/cu m	53.20	42.65	Upto 3,530	nil
				3,531-4,000	3.65
	b) FOB value exceeding $ 450/cu m	73.00	58.50	4,001-4,500	4.00(3)
				4,501-5,500	4.85
	ii) Parity rate from India - Same as in 2 above.				
4)	Promotional rate from India to ensure parity of freight incidence(4)	26.45	21.20	3,531-4,500	5.03/1000 kg
				4,501-5,500	6.06/1000 kg
5)	Compensation for additional cost of carriage from India in comparison to developed countries @ 20% of step 4	5.30	4.24	3,531-4,000	5.20/1000 kg
				4,001-4,500	5.97/1000 kg(5
				4,501-5,500	7.54/1000 kg

Sl. No.	Steps	Basic $/1000 kg	Basic $/cu m	Heavy lift charges Weight range kg	Heavy lift charges S/cu m
6)	Promotional rate adjusted for compensation for extra cost of carriage	31.75	25.44	3,531-4,000 4,001-4,500 4,501-5,500	3.65/1000 kg 11.3/1000 kg 13.6/1000 kg
	Rounded off to	32.00	25.50	Up to 3,530 kg 3,531-4,000 4,001-4,500 4,501-5,500	nil 3.65/1000 kg 11.3/1000 kg 13.6/1000 kg
7)	Rationalisation of promotional rate by altering freighting basis(6)				
	i) FOB value up to $ 500/cu m	-	5.50 + 8% ad valorem	Up to 3,530 3,531-4,000 4,001-4,500 4,501-5,500	Nil 3.65/1000 kg 11.3/1000 kg 13.6/1000 kg
	ii) FOB value exceeding $ 500/cu m	-	5.50 + 10% ad valorem		
			Subject to minimum total of $ 25.5 and maximum total of $ 65.		

Notes:

(1) These are general cargo rates. The rates for item of machinery not otherwise specified are still lower at $ 55.90/1000 kg or $ 44.80/cu m uniformly applicable to all values of machines. Freight ton on this route consists of 40 cu ft. Hence $ 500 per freight ton = $ 447/ cu m.

(2) Ratio of distances from Bombay and Japan (Yokohama) = $\frac{8196}{9700}$ = 0.84
Stevedoring expenses on routes to USA is estimated at 35% and other expenses at 65% of the cost of voyage. Therefore, reduction in the basic Indian rate to make it equitable with the Japanese rate = 0.16 x 0.65 = .104.
∴ Equitable basic rate from India = 47.7 x 0.894 = $ 42.65/cu m.

(3) Considering stowage factor of 2.8 cu m/1000 kg, $ 11.3/1000 kg = $ 4/cu m.

(4) $$\frac{\text{FOB Value of Indian Package per cu m}}{\text{FOB Value of Japanese package per cu m}} = 44.5\%$$

Therefore, basic rate = 0.445 x 47.70 = \$ 21.20 per cu m.
Similarly heavy lift rate = 0.445 x 11.3 = \$ 5.03/1000 kg.

(5) The compensation for heavy lift rate is assumed as full difference between Japanese rate and rate in step 4 as it is based on stevedoring expenses which do not vary significantly on two toutes under comparison.

(6) The lower limit for rationalisation is set by the figure rounded of under step 6 and an intermediate point on the scale is approximately fixed by the figure of \$ 42.65/cu m for equitable rate derived under step 3.

Thus the incidence of freight after rationalisation would work out as under:

FOB value of machine \$/cu m	Freight rate \$/cu m	Incidence of freight % of FOB value
250	5.5 + 20 = 25.5	10.20
300	5.5 + 24 = 29.5	9.83
400	5.5 + 32 = 37.5	9.38
450	5.5 + 36 = 41.5	9.25
500	5.5 + 40 = 45.5	9.10
600	5.5 + 60 = 65.5	10.85

29.10 Recommendations

(1) The Freight Investigation Bureau should pursuade conference/shipping lines to correct the various anomalies and discriminations in freight rates brought out in the foregoing discussion.

(2) The Freight Investigation Bureau should take up the subject of rationalisation for freight rates with conference/shipping lines to ensure parity of incidence of freight with respect to FOB values of machine tools realised by the Indian exporter and his foreign competitor. Guide lines for such rationalisation have been indicated by an

exercise for India/USA Atlantic coast route. Effect of such rationalisation is to reduce the incidence of freight on this route from 20/27 per cent to 10/11 per cent of the FOB value of the machine tools.

It is suggested that the Government of India may also endeavour through UNCTAD to secure acceptance of this selective approach by conference and shipping lines for introduction of promotional freight rates in the tariffs as elaborated in this study.

30. Aggregate Incidence of Transport Cost

The aggregate incidence of transport cost varies from route to route for a variety of reasons. Its magnitude can be best visualised by a case study shown in Appendix 16 for export of machine tools to USA (East Coast) (one of India's priority markets) from India, Japan and U.K. Transport costs have been worked out for two manufacturing centres in India, namely Bangalore and Batala. These locations are representative of the two regions, i.e. Mysore and North-west India where there is concentration of machine tool industry.

The break-down of estimated incidence of transport cost from these countries is summarised in Table 28.

It is evident from the table on the next page that the Indian exporter, in respect of packing, inland transport and ocean freight, on export of machine tools to USA (Canada also), has to incur expenses at about 35 to 38 per cent the FOB value, as against 8 to 12 per cent incurred by his competitors in U.K. and Japan. This burden on him will get reduced to half, giving a saving to the tune of 18 to 20 per cent of the FOB value on the basis of the recommendations indicated.

Table 28 - Analysis of Transport Cost on Export of Machine Tools to USA (East Coast) from India, Japan & UK

Item Country of Manufacture	Incidence of Transport Cost with reference to respective FOB values of M/c tool package			
	Packing %	Inland transport %	Ocean freight %	Total transport cost %
As at present				
India (Bangalore) ..	5.14	4.65	25.01	34.80
India (Batala) ..	5.14	7.35	25.01	37.50
Japan ..	2.02	0.35	9.52	11.89(27.10) (1)
UK (Colchester) ..	2.02	0.35	5.36	7.73(17.95)
With Recommendations Implemented				
India (Bangalore) at equitable ocean freight rate	4.64	2.13	16.13	22.9
India (Bangalore) at promotional ocean freight rate	4.64	2.09	11.37	18.1
India (Batala) at equitable ocean freight rate	4.63	3.03	16.13	23.8
India (Batala) at promotional ocean freight rate	4.64	2.89	11.37	18.9

Note:

(1) Represents incidence of transport cost on the assumption that the realisation of the FOB value by the foreign competitors is as low as that of the Indian exporter.

The statement of profit analysis presented elsewhere shows that the Indian manufacturer incurs at present loss on exports of machine tools to the extent of about 35 per cent of the FOB value. The effect of implementing the recommendations outlined in this study would be to reduce these losses by 15 to 20 per cent.

In regard to the remaining gap of 15 to 20 per cent, there appears to be enough scope both at the industry level and Government level to wipe out this loss by better management of the available resources.

Appendix - 1

The Total Market for Machine Tools and Imports for Selected Developed Countries, 1967

(in millions of US $)

Country	Total Market	Share of Total World Market	Imports	Share of Total Imports
I. North America	1,970	32.8%	282	17.6%
U.S.A.	1,852	30.9%	178	11.1%
Canada	118	1.9%	104	6.5%
II. ECM Countries	1,066	17.8%	356	22.2%
West Germany	438	7.3%	58	3.6%
France	315	5.3%	117	7.3%
Italy	205	3.4%	95	5.9%
Benelux	48	.8%	37	2.3%
Sweden/Denmark	60	1.0%	49	3.1%
III. U.K.	465	7.7%	154	9.6%
IV. Other European Countries	226	3.8%	108	6.8%
Switzerland	64	1.1%	30	1.9%
Spain	132	2.2%	53	3.3%
Portugal/Austria	30	.5%	25	1.6%
V. Japan	333	5.5%	36	2.2%
VI. Australia	60	1.0%	37	2.3%
VII. Centrally Planned Economies	1,418	23.6%	318	19.9%
U.S.S.R.	934	15.6%	120	7.5%
Czechoslovakia	141	2.3%	45	2.8%
East Germany	119	2.0%	25	1.6%
Poland*	80	1.3%	42	2.6%
Yugoslavia	58	1.0%	51	3.2%
Hungary*/Rumania	86	1.4%	35	2.2%
Total of all countries listed above	5,538	92.3%	1,291	80.7%
Estimated World Production	6,000	100.0%	1,600	100.0%

* Based on 1966 figures

Appendix - 2

The Total Market for Machine Tools and Imports for Selected Developing Countries, 1967

(in Millions of U.S. $)

Country	Total Market	Imports	Share of Total Imports
Brazil	41.3	21.3	1.3%
Argentina	29.8	11.6	.7%
Mexico[2]	N.A.	35.9	2.2%
Colombia[2]	N.A.	10.6	.7%
Turkey[2]	N.A.	6.6	.4%
Lebanon[2]	N.A.	2.8	.2%
UAR	6.5	6.2	.4%
Morocco[1]	N.A.	3.4	.2%
East Africa	1.9	1.9	.1%
Nigeria	.9	.9	.1%
Ghana	.5	.5	Neg
Thailand	4.0	3.6	.2%
Total of available data listed above	84.9	105.3	6.6%
Share of Total World Market	1.4%		

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1) Refers to 1964
2) Refers to 1965
N.A. means 'Not available'.

Appendix - 2A

Exports of Machine Tools(1) from 14 Major Supplier Countries to All Countries(2), 1964-66

(Value in '000 US $)

Destination	1964		1965		1966	
	Value	% of Exports to World	Value	% of Exports to World	Value	% of Exports to World
World	1083300	100.0	1089103	100.0	1193699	100.0
North America	106237	9.8	136059	12.5	212065	17.8
U.S.A.*	40016	3.6	59173	5.4	125730	10.6
Canada*	66221	6.2	76886	7.1	86335	7.2
Latin America	78577	7.3	73494	6.7	73695	6.3
Argentina*	11598		9123		11588	
Bolivia	158		239		189	
Brazil*	12496		9262		15777	
Chile	3216		4106		3469	
Colombia	3067		2416		1688	
Costa Rica	326		853		312	
Dominican Rep.	326		124		167	
Ecuador	550		389		703	
El. Salvador	740		1058		912	
Guatemala	619		627		699	
Honduras	93		148		195	
Mexico*	35945		33150		25213	
Nicaragua	222		707		655	
Panama	212		256		509	
Jamaica	386		388		669	
Peru	1516		2866		3399	
Trinidad & Tobago	173		337		341	
Uruguay	361		291		200	
Netherlands Antilles	92		128		64	
Venezuela	6481		7026		6946	
West Europe	552267	50.9	550669	46.6	590402	49.4
EEC	285111	26.3	263608	24.2	275294	23.1
Belgium-Lux*	40402		42635		31052	
France*	93723	8.7	84288	7.7	96297	8.1
West Germany*	55493	5.1	70292	6.5	61511	5.2
Italy*	62765		33289		58131	
Netherlands*	32728		33104		28303	

Appendix 2A (cont'd)

Destination	1964		1965		1966	
	Value	% of Exports to World	Value	% of Exports to World	Value	% of Exports to World
UK*	91348	8.4	87740	8.1	98203	8.2
Others	175808	16.2	199321	18.3	216905	18.1
Denmark*	11552		14491		12919	
Norway	6885		7977		9676	
Sweden*	30455		39106		42562	
Austria*	15557		16135		19571	
Portugal	4707		6599		7448	
Switzerland*	35594		28510		31545	
Ireland	2788		1912		2039	
Greece	3950		4521		4894	
Finland*	7577		8227		10038	
Yugoslavia*	15970		10669		12867	
Spain*	40773		61174		63346	
Eastern-Europe	68722	6.3	60928	5.6	71182	5.9
USSR*	29714		23122		22252	
Bulgaria	3494		2097		4993	
Czechoslovakia*	11330		8957		15068	
East Germany	2168		2028		4379	
Hungary	5534		5232		8376	
Poland*	9055		10421		8615	
Rumania	7427		9071		7499	
South East & East Asia (except Japan)	15347	1.4	15361	1.4	23210	1.9
Vietnam Republic	656		680		868	
Indonesia	992		931		1787	
Korea Rep.	1084		1870		5458	
Philippines	4129		3191		3496	
Thailand	3049		2491		2912	
Malaysia-Singapore	1672		1632		3394	
Hong Kong	1713		1379		1370	
China (Taiwan)	2052		3187		3925	

Appendix 2A (cont'd)

Destination	1964		1965		1966	
	Value	% of Exports to World	Value	% of Exports to World	Value	% of Exports to World
West Asia & UAR	19227	1.8	17461	1.6	22664	1.9
Turkey	3876		4703		7103	
Aden	30		41		72	
Kuwait	183		235		315	
Jordan	252		226		171	
Israel	4664		4035		3894	
Iran	2263		3166		4598	
Iraq	289		458		1118	
Saudi Arabia	433		627		588	
Lebanon	1181		1108		887	
Syria	586		539		236	
UAR	5470		2323		3662	
South Asia	74618	6.9	69116	6.3	59290	4.9
Burma	2094		1068		781	
Ceylon	638		424		324	
India*	64511		58393		51573	
Pakistan	7375		9231		6612	
Australia - NZ	38918	3.6	45865	4.2	38849	3.3
Australia*	34776	3.2	41448	3.8	34655	2.9
New Zealand	4142		4417		4194	
Japan*	73314	6.8	45903	4.2	26246	2.2
Africa	42909	3.9	51175	4.7	40863	3.4
Libya	439		803		681	
Sudan	378		332		191	
Ethiopia	154		289		292	
S. Africa*	33855		40486		27796	
Tanzania	228		212		300	
Kenya	575		521		605	
Uganda	55		195		154	
Ghana	423		1002		2360	
Nigeria	1306		1246		1549	
Rhodesia	31		302		186	

Appendix 2A (cont'd)

Destination	1964 Value	1964 % of Exports to World	1965 Value	1965 % of Exports to World	1966 Value	1966 % of Exports to World
Africa (cont'd)						
Zambia	9		147		269	
Ivory Coast	407		372		524	
Congo (Kingshasa)	1092		780		1002	
Angola	355		349		689	
Mozambique	323		756		1021	
Algeria	652		1123		1076	
Morocco	950		627		926	
Tunisia	1381		1434		1148	
Liberia	296		199		94	
Others	13164	1.2	23071	2.1	35256	2.9

Source: Export Statistics for 14 countries collected in: US Dept. of Commerce Market Share Report: Machine Tools, (DIB68 - 90812).

* Exports to these destinations from the 14 supplier countries were over $ 10 million in one year. These are hence the major export markets for machine tools.

Notes:

(1) The definition of "Machine Tools" for the purpose of these statistics is as given by SITC No. 715 No. 715.1.

(2) Includes exports of U.S., Belgium-Luxemburg, West Germany, Italy, Netherlands, U.K., Sweden, Japan, Canada, Denmark, Norway, Austria and Switzerland.

Appendix - 3

Ratio of Exports to Production of Machine Tools for Selected Countries, 1967

Total, all countries	24%
Large Western European	
West Germany	54%
Italy	47%
France	44%
U.K.	29%
Small Western European	
Denmark	89%
Switzerland	79%
Belgium	78%
Austria	77%
Sweden	74%
Netherlands	68%
Eastern European	
Czechoslovakia	59%
East Germany	50%
Yugoslavia	45%
Poland	40%
North America	
Canada	42%
U.S.	11%
Japan	15%
U.S.S.R.	7%

Appendix 3A

Prices of U.S. and Foreign Machines to Final Customer in USA

Lathes

		Ex-Godown, New York $
HITACHI (Japan)	Model 7D, Saddle type turret lathe, chuck dia. 18, swing over bed 29-7/8"	34,000
MITSUBISHI (Japan)	High speed lathe, Model HL 300 Va, 13-3/4" x 29-1/2"	5,500
LANSING (Italy)	Lathe 15" x 40" with 4-1/8" spindle hole	4,512
HERCULES-AJAX (Italy)	Tool room & engine lathe 14" x 60"	3,650
HERCUIES-AJAZ (Italy)	Tool room & engine lathe 14" x 40"	3,450
STANDARD-MODERN (Canadian)	Series 1000 light duty lathe 9" x 22"	1,276
"	Series 2000, 11" lathe D1 4 Camlock spindle	2,345
"	Series 2000, 13" lathe D1 4 Camlock spindle	2,345
"	Series 2000 tool room lathe 13" x 30", D1 4 Camlock spindle	3,600
FORADIA	Type OM 180/1000 precision engine lathe, 1 4-3/4" x 40"	3,950
GRAZIANO (Italy)	Model SAG 14 lathe	4,510
OKK-RAMO	Model T-45-15 multi purpose lathe 17-3/4" x 59"	5,750

Appendix 3A (cont'd)

		Ex-Godown, New York $
	Drills	
STANDARD-MODERN (Canadian)	Radial drill, 24" capacity	2,236
SPEEDMASTER	Unidesign radial drill Model 2 3"-8"	2,990
ARBOGA	Model RLM 3508 column drilling Machine, 9" column, 40" arm, 1-5/8" capacity	3,400
OOYA (Japan)	Model RE-1000 radial drilling machine, 35" drilling capacity in steel, 1030 mm column to sprindle centre	5,600
"	Model RE-1250 radial drilling machine, 35" drilling capacity in steel, 1255 mm column surface to spindle centre	5,950
DONAU (W. Germany)	Model DR-23 radial drilling machine, 1-1/8" capacity in steel	4,515
"	Model DR-32 radial drilling machine, 1½" capacity in steel	5,885

Appendix 3A (cont'd)

		Ex-Godown, New York $
	Milling Machines	
ENSHU (Japan)	Horizontal milling machine, Model HA, 43-1/4" x 10¼" table	5,995
ENSHU (Japan)	Horizontal milling machine, Model HF, 51-1/8" x 10-5/8" table	6,900
HITACHI (Japan)	Medium type plain milling machine Model 2 MP, 55-5/32" x 12-1/4" table	12,400
"	Milling Machine, Model 2 M, 53-1/8" x 12-1/4" table	12,400
"	Milling machine, Model 3 M, 63" x 14" table	17,600
SHIZUOKA (Japan)	Model SP-CH horizontal milling machine, 11" x 43¼" x table size	6,900
SHIZUOKA (Japan)	Model SV-CH, vertical milling machine, 11" x 43¼" table size	5,300
IWASHITA (Japan)	Model NK-65, horizontal milling machine, 8¼" x 33½" table size	2,800
BEAVER (U.K.)	Mark II milling machine 10" x 48" table	3,250
"	Mark II milling machine 10" x 56" table	3,400
CORREA-IZDA	No.2 Universal milling machine	5,775
SOUTH-BEND (American)	Model MIL 3212 vertical milling machine	2,279
FRITZ WERNER (Canada)	Model FV1½ milling machine, 39" x 12" table	7,400
"	Model FV2D, 53" x 14" table milling machine	21,252
"	Model FV1D milling machine 43" x 12" table	15,725

Appendix 3A (cont'd)

		Ex-Godown, New York $
ADCOCK SHIPLEY (U.K.)	Model IES-G horizontal milling machine	2,700
"	Model IES-M horizontal milling machine	2,325
BRIDGEPORT (American)	Model 9BRJ vertical milling machine 9" x 32" table	1,745
EX-CELL-O (Canada)	Style 602 milling machine 9" x 36" table	2,945
SAIMP (Italy)	Model FV-)/SM milling machine 10" x 44" table size	3,250
"	Model FVR-2/M milling machine 12" x 35" table	
	Grinders	
MAKINO (Japan)	Universal cutter and tool grinder Model C40, table surface 5-13/16" x 37½", distance between centres 27"	4,500
JACOBSEN (Swedish)	Hydraulic surfacing machine 24" x 16" max surface, 12" x 2" wheel dia	8,850
BOYER-SCHULTZ (American)	Surface grinding machine 18" x 5-5/8" table, 7" wheel dia	2,285
AGATHON (Swiss)	Model 150A double ended carbide tool grinder 6" wheel dia	1,840
POWERMATIC (American)	Precision surface grinder, 6 x 12 model	1,085

CURRENT PRICES OF INDIAN MACHINE TOOLS IN INDIA

Item	Manufacturer	Model	Specification		Power	Price
			Swing over bed mm	Admit betn. centres mm	kW	Rs
1. Lathe	Heavy Engineering Corpn.	LC/100/3000	1000	3000	40	312,900
	Hindustan Machine Tools Ltd.	LB-17	350	700	7.5/5	24,250
	"	LB-20 (Gap)	410	1500	7.5/5	28,650
	"	LB-25 (Gap)	500	3000	7.5/5	46,600
	"	H-22	460	1000	9.5	43,850
	"	H-26	530	3000	9.5	54,200
	Amar Machine Tools Pvt. Ltd.	Amar CB-1	286	500	.746	4,600
	"	MT-1	330	610	1.1	5,800
	Batala Engg. Co. Ltd.	Beco-Graziano SAG-180	362	1000	3.7	21,000
	"	Master	300	1000	1.5	7,900
	Mysore Kirloskar Ltd.	GD-1	330	600	0.75	10,800
	"	Rigiturn	430	2840	3.75	29,300
	"	RL-R3	520	4110	7.5	61,800
	R.K. Machine Tools	RK	560	2045	3.7	20,000
	Parmar Mechanical Works	PMT-4	300	1067	1.1	6,100

	Item	Manufacturer	Model	Specification Table Size	Power kW	Price Rs
2.	Milling Machines	Hindustan Machine Tools Ltd.	M2H (Horizontal)	1100 x 310	5.5	46,000
		"	M2V (Vertical)	1100 x 310	5.5	50,300
		"	M2U (Universal)	1100 x 275	5.5	48,300
		"	FV2D (Vertical) Electrically controlled	1350 x 355	8.5	87,900
		"	FH2D (Horizontal) Electrically controlled	1350 x 355	8.5	84,100
		"	FU3D (Universal) Electrically controlled	1350 x 300	8.5	86,800
		"	FH3 (Horizontal)	1600 x 355	8.5	85,800
		Batliboi & Co. (P) Ltd.	FA3H (Horizontal)	1250 x 300	4	45,000
		"	FA3V (Vertical)	1250 x 300	4	48,000
		"	FA3U (Universal)	1250 x 300	4	48,000
		Bharat Fritz Werner (P) Limited	FH (Horizontal)	1000 x 225	3	27,000
		"	FV (Vertical)	1000 x 225	3	28,000
		"	FU (Universal)	1000 x 225	3	28,000

	Item	Manufacturer	Model	Specification		Power kW	Price Rs
				Table size, mm			
2.	Milling Machines	Bharat Fritz Werner (P) Ltd	FHO	710 x 225		2.2	25,800
		"	FVO	710 x 225		2.2	26,800
		"	FUO	710 x 225		2.2	26,800
				Capacity in M.S. (mm)	Radii (mm)		
3.	Radial Drilling Machines	Heavy Engg. Corporation	DR-8	80	2575	7.5	92,200
		Hindustan Machine Tools Ltd.	RM-60	50	1075	3.6	37,500
		"	RM-62	50	1500	3.6	43,000
		"	RM-82	75	2500	7.5	78,375
		Batliboi & Co. (P) Ltd.	VR-2	32	910	1.5	26,750
		"	VR-4	50	1415	3.75	34,000
		Oriental Elec. & Engg. Co.	Oriental Town AE4	Capacity in steel 50	1400	3.7	39,500
				Capacity in M.S. (mm)			
4.	Column Drilling Machines	Tata Engg. & Locomotive Co.	CD-40	40		5.5	34,000
		"	CD-25	25		2.5	22,000
5.	Turret & Capstan Lathes	Hindustan Machine Tools Ltd.	L-22TP	Bar capacity 63 mm		9.3	54,150
		Mysore Kirloskar Limited	Kirloskar-Herbert No.4	" 50 mm		5.5	63,000

Appendix 31 (cont'd)

	Item	Manufacturer	Model	Specification	Power kW	Price Rs
5.	Turret & Capstan Lathes	Mysore Kirloskar Limited	Kirloskar-Herbert No. 9C/30	Bar Capacity 108 mm	18.5	181,400
		TEXMACO Limited	Texmaco-Ward No.3C (Capstan)	" 50 mm	3.7	46,000
		Industrial Plants Limited	IPL-Hitachi 3A-II(Capstan)	" 50 mm	3.7	39,200
6.	Surface Grinders	Hindustan Machine Tools Ltd	SFW2	Table size 250 x1500 mm	7.5	104,300
		Praga Tools Limited	540H	" 150 x 450 mm	0.75	31,900
7.	Tool & Cutter Grinder	Praga Tools Limited	310	Swing 200 mm, admit between tail stock centres 480 mm	0.56	24,200
8.	Shaping	Cooper Engineering Ltd	CSM-63	Stroke 630 mm	2.25	10,300
		Cooper Engineering Ltd	RGP-28	Stroke 710 mm	7.5	52,500
		Sagar Engineering Works	SM-24	Stroke 600 mm	2.25	6,625
9.	Slotting Machines	Cooper Engineering Ltd.	CH-16	Stroke 160 mm	1.5	13,600
			CH-25	Stroke 250 mm	4.5	40,700
			CH-40	Stroke 400 mm	9.0	70,300

Appendix - 4

Code of Grants- In - Aid for Export Effort available from the marketing Development Fund
July, 1968
Ministry of Commerce

Code of Grants - In - Aid

This code replaces the Code of Grants-in-aid which was promulgated by the then Ministry of Commerce in August 1965. It furnishes information about various forms of assistance which will be made available from the Marketing Development Fund of India to the Export Organisations including the Export Promotion Councils and other organisations of industry and trade as well as to individual exporters.

INTERPRETATIONS:

The word 'Fund' wherever it appears in this code will mean the 'Marketing Development Fund' set up by Government of India for promotion of export trade.

The term 'Approved Organisations' will mean an organisation, institution or association dealing with exports, which is approved by the 'Fund' for this purpose. Any organisation, institution or Association which wants to get itself registered as an 'Approved Organisation' may apply to the Ministry of Commerce with full particulars.

Assistance from the Fund will also be available to Export Houses and individual exporters as stipulated in this code.

I. TRADE DELEGATIONS AND STUDY TEAMS

1. Delegations

The fund may grant 50 per cent of the expenditure on each delegation including the cost of international travel and itinerary abroad provided:-

(1) The direct purpose of the delegation is related to exports;

(2) The proposal of the delegation is sponsored by an Approved Organisation, and the balance cost is recovered by it from the participants or their sponsors;

(3) The delegation makes adequate study of its problems within the country before going abroad.

(4) The delegation undertakes to submit a preliminary report of the tour within one fortnight of the return and the complete report within two months; and the report should be made available to industry and trade;

(5) Members of the delegation should be available, on request to disseminate to others the knowledge and experience gained abroad by them.

2. Study Teams and Sales Teams

Whereas Trade Delegation will largely comprise business men, industrialists, managers, directors, etc., it is envisaged that Study Teams and Sales Teams consisting of one person or more and comprising primarily technicians, sales executives and market research staff including officials of the Approved Organisations may also be sponsored by the Approved Organisation. The Study Team will study the problems relating to marketing of specific products in specified countries whereas the Sales Teams will negotiate and transact business during their itinerary abroad:

The Fund may grant two-thirds share of the total cost of sponsoring Study Teams and 50% of the cost of sponsoring Sales Teams including the cost of international travel, and the remaining portion of the expenditure will be borne by the sponsoring organisation. The other conditions specified in regard to the delegation will also apply to Study Teams and Sales Teams.

3. Sales Teams of Individuals

Where any individual is sponsored by an Approved Organisation in relation to its administration and related work, or for making studies in relation to a particular product in a specified country or countries, and where the report of such studies will be made available to the industry and trade in general, the Fund may grant two-third of the total cost including the cost of international travel and itinerary abroad the remaining one-third being met by the sponsoring organisation. The individual may be either an official of the approved organisation or a suitable person selected from the industry or trade.

4. Foreign Delegations

The Fund may make a grant of 75% of the expenditure on inviting delegations of business men, consultants and specialists handled by the aoproved organisation and who are invited by such approved organisations. The benefit of the visit of such representatives of businessmen and industry from foreign countries should be available to the industry.

II. MARKET STUDIES

5. The Provisions under this head will apply to Market Surveys, Market Research, Area Surveys, Product Surveys, etc.

Out of the total expenditure incurred in conducting (a) commodity surveys within the country for determining export potential and (b) Market Studies abroad, the Fund may grant:

(1) 75 per cent to 100 per cent where the studies are sponsored or undertaken by Export Promotion Councils, Universities and other Institutions.

(2) Two-thirds where the studies are sponsored or undertaken by other Approved Organisations.

(3) 50 per cent where any commodity survey within the country for determining export potential is undertaken by a recognised Export House.

(4) 60 per cent where any market study abroad is undertaken by a recognised Export House.

Provided that:

(a) the agencies in India and abroad utilised for conducting research and surveys are approved by the Indian Institute of Foreign Trade; and market surveys and commodity research projects for which assistance from the Fund is sought should be referred to this Institute except where the proposals have emanated from the Institute;

(b) the reports of studies and research are made available to the industry and trade;

(c) the persons or agencies appointed for the study undertake tour abroad normally not more than three months at a time and are entrusted with sufficient work for such period, in order to derive full utility from the assignment for travel abroad.

The approved organisations will draw up a phased programme for conducting such studies and surveys, aiming at covering the range of all important products in relation to important countries. Assistance of Government of India's Commercial Representatives abroad will be available to the extent possible for making the Market Studies and Surveys.

EXPLORATION OF NEW MARKETS

6. The Fund may grant assistance upto 50 per cent for Schemes of exploration of new markets by Export Houses.

III. EXPORT PUBLICITY INCLUDING INFORMATION AND EXHIBITIONS

7. Publications

(a) PUBLICATIONS FOR ISSUE WITHIN THE COUNTRY INCLUDING JOURNALS, DIRECTORIES, PAMPHLETS FOLDERS, ETC.

The Fund may grant up to 75% of the net expenditure on these publications, after taking into account the revenue from sales and advertisements.

(b) PUBLICATIONS FOR USE ABROAD, INCLUDING JOURNALS, DIRECTORIES, BROCHURES, PAMPHLETS, FOLDERS ETC.

The Fund may grant 75% of the net cost of bringing out such publications including expenses abroad, after taking into account the revenue from sales and advertisements where the publications are brought out by the approved organisations and 50% of the expenditure where the publications are brought out by an Export House.

In respect of (a) and (b) above, the objective should be to make these publications self-financing to the extent possible.

Advice of the Director of Commercial Publicity will be available to Approved Organisations for ensuring high quality and utility of these publications and the proposals will be scrutinised by him where necessary, before submission to the Fund.

OTHER PUBLICATIONS

For the purpose of bringing out special supplements in selected newspapers and periodicals abroad grants of 50% may be made available from the Fund to Approved Organisations sponsoring such supplements.

8. Advertisements Abroad

The Fund may grant 75% cost of the advertisements abroad incurred by the Approved Organisations where the advertisements do not constitute brand publicity and are collective advertisements of the Approved Organisations.

9. Brand Publicity

(a) For brand publicity including advertisements of the brands of individual concerns, the Fund may grant 33-1/3 per cent of the cost where such brand publicity is sponsored by approved organisations.

(b) Where the brand publicity project is not sponsored by an approved organisation, but is considered to be useful, the Fund may also grant upto 25 per cent of expenditure subject to prior approval of the project.

10. These provisions will apply to the advertisements in newspapers and periodicals abroad or through such other media as might be considered useful by the Fund.

11. Public Relations

For work of public relations relating to exports, including utilisation of agencies abroad the Fund may grant 75% of the expenditure provided that the Agency is selected out of the agencies approved by the Fund.

12. Publicity Films

The Fund May grant assistance upto 100 per cent of the cost of making first film in colour or in monochrome in India for publicity relating to exports of any particular commodity where the film is not for brand publicity and is for collective advertisements by the approved organisations and up to 75% for subsequent films. The Fund may also grant up to 50% of the cost of making film for brand publicity where such brand publicity films are sponsored by an approved organisation.

13. Exhibitions

The Fund may grant upto 75 per cent of the total expenditure incurred by an Approved Organisation in participation in or in organising Exhibitions abroad, or in India in relation to export effort, and 50 per cent of the total expenditure on such participation in an exhibition abroad by Export Houses.

Where India participates in special events or organises prestige exhibitions abroad, a rate of assistance higher than 50 per cent for participation by an Export House, may be considered depending on merits.

In making the estimates of total expenditure the cost of exhibits will be excluded but the cost of transport thereof will be included.

The same percentages will be applicable in respect of the exhibits meant for display in showrooms abroad.

14. Despatch of Samples

The Fund may grant upto 50% of the expenditure by an approved organisation on despatch of samples abroad. Such grants should not exceed Rs 5,000/- for any Approved Organisation. The despatch of such samples should be approved by a properly constituted Committee of Administration or Executive Committee of the Approved Organisation.

15. Import of Samples

The Fund may grant upto 50% of the expenditure to an Approved Organisation for securing samples. The grant from M.D.F. will be limited to Rs 10,000/- per-annum in the case of Engineering products and Rs 5,000/- in other products.

16. FOREIGN OFFICES

(i) For opening foreign offices the Fund may grant 75 per cent of the total expenditure for the first 3 years where offices are opened by an approved organisation and 50 per cent of the total expenditure for the 4th and 5th years. Where the Foreign Offices of Export Houses also function on behalf of Approved Organisations, the Fund may grant one-fourth expenditure on accommodation and staff for the first three years.

(ii) (a) In permitting the opening of foreign office, the objective will be kept in view that, to the extent feasible the offices at any selected place should jointly serve two or more organisations. Where any Foreign Office is opened by a group of two or more Export Houses, the Fund may grant one-third of the expenditure on accommodation and staff for the first year and 25 per cent for the second year.

(b) The Fund may also grant upto 25 per cent of the expenditure on accommodation and staff for the first year and 20 per cent for the second year when Foreign offices are opened by only one Export House.

For appointment of correspondents abroad the Fund may grant for the first 3 years upto 75 per cent of the expenditure incurred by an Approved Organisation; such expenditure on a correspondent should not normally exceed Rs 15,000/- per year. The Fund may grant 50 per cent of the expenditure incurred by an Approved Organisation during the 4th year and 25 per cent during the 5th year.

17. Setting up of Warehouses or after sales service Establishments by Export House

Where Warehouses and/or after sales service installations are set up by Export Houses or a group of Export Houses, the Fund may grant assistance up to 25 per cent for a period of three years from the date of opening of such Centres.

18. QUALITY CONTROL AND PRE-SHIPMENT INSPECTION

For implementation of the Quality Control and Pre-Shipment Inspection Schemes the Fund may grant upto 95 per cent of the net expenditure to an Approved Organisation for the first 3 years subject to the approval of the schemes by the Export Inspection Council.

19. RESEARCH AND PRODUCT DEVELOPMENT

(i) For Schemes of research and product development relating to export effort, the Fund may grant upto 75 per cent of the total expenditure to an Approved Organisation.

(ii) The Fund may also grant assistance upto 50 per cent for schemes of research and product development when implemented by Export House subject to prior approval.

20. CONCLUSION

If any additional essential activities or proposals connected with the export effort which qualify for the grant-in-aid are brought to the notice of the Fund Committee or the Government such proposals will also be considered on merits for giving grants from the Fund.

TRUE COPY

Appendix - 5

Ref: 61/68-69
Nov. 20, 1968

The Secretary to the Govt. of India,
Ministry of Commerce,
New Delhi.

Kind attention: Shri A.C. Banerjee
Joint Secretary

Dear Sir,

Request for grant-in-aid from Market Development Fund for export of Machine Tools

The Indian Machine Tool Industry can now be said to have technologically 'arrived'. It is confident of its capacity to build quality machine tools. It is to the credit of the industry that this break-through has been achieved in a remarkably short span of 10 years.

Inspired by this self-confidence, the industry is now looking for new export avenues. India's present share in the total world imports of about Rs 965 crores is only about Rs 70 lakhs. About 75 per cent of the world imports is accounted for by 18 advanced countries, which include the U.S., Canada, West European countries, Centrally Planned European economies, Australia and New Zealand. A statement giving an idea of the world market and imports of machine tools in selected developed countries is appended.

International market for machine tools is continuously expanding, the world demand having nearly doubled in the past decade. Recent surveys also point to a good export potential for Indian machine tools.

The Working Group for Machine Tools is understood to have recommended a target of Rs 7.5 crores for export of machine tools by the end of the Fourth Plan. To raise the present export figure to Rs 70 lakhs to Rs 7.5 crores calls for a mighty effort, for ours is a developing country with its image as a machine tool builder not yet established, and the completion offered by developed countries in the international market is fierce. A number of machine tool units, including the Hindustan Machine Tools Ltd., have already started tentatively exploring export markets in developed countries but it is now fairly certain that no individual unit can hold its own in the face of the enormous cost of projecting the country's image and of sales promotion.

It is also clear to the industry that in view of the prohibitive expenses of sales and sales promotion in foreign countries, we would not be well advised to dissipate our energies in various countries and should instead undertake concerted efforts to develop our efforts to a few selected, priority areas. These priority markets, as suggested by different surveys, are North American Region consisting of U.S.A., and Canada, the U.K. and Germany in Western Europe, and Australia and New Zealand.

The paramount task is to build a favourable image of the country as a machine tool builder and as a preliminary step to this end the Association has published a "Guide to Indian Machine Tools 1968" a copy of which has already been sent to you. We enclose another copy of this Guide for your ready reference. We have also made representations separately to you for a subsidy for meeting the expense of this Guide and circulating it amongst various organizations abroad free of cost.

At a recent meeting, the Association examined a number of proposals for the promotion of exports of Indian machine tools and formulated the following schemes. In the formulation of these schemes the Hindustan Machine Tools Ltd have also been consulted who have assured us of their participation in them.

Machine Tool Fairs Abroad

It is proposed to participate in important machine tool fairs abroad with a view to projecting India's image as a machine tool producer. Our participation in such fairs would afford an opportunity for the machine tool dealers and users to see for themselves the quality of machine tools available from India. It is estimated that participation in the international machine tool fairs would cost us roughly between Rs 8 to 10 lakhs per fair. It would not be possible for the individual units to bear the burden of this exhorbitant cost. It is, therefore, requested that in the initial period of at least three years, until India's image as a quality machine tool builder is established, the Government may bear 90 per cent if not the full cost of the expenditure for organising such exhibitions. It may be possible later on, say after four or five years, for the industry to be on its own legs and bear a larger part of such expenditure. The subsidy required by the industry in the next three years would be about Rs 25 lakhs on this account.

In the beginning we would like to concentrate on two or three exhibitions like the European Machine Tool Fair to be held in Paris in 1969, Chicago Machine Tool Fair to be held in the

USA in 1970, and Olympia Machine Tool Show in the U.K. We are to organise an Indian machine tool pavilion at the 11th European Machine Tool Exhibition to be held in Paris from June 23 to July 2, 1969. This is one of the most important international fairs and can offer great business opportunities to the Indian machine tool industry. The total area required for organising the Indian pavilion at this fair would be 800 to 1000 sq. metres. A representative of the Association had recently visited Paris and had discussions with the organisers of the Fair, the French Machine Tool Manufacturers' Association. We have been assured of full co-operation and assistance by the organisers for setting up this pavilion. It has been ascertained that the cost of organising this pavilion would be about Rs 8 lakhs. Participants in this pavilion would include graded machine tool producers from India both from the public and private sectors.

Since the time left at our disposal for organising this pavilion is very short, we shall be grateful if a subsidy of Rs 7.20 lakhs is sanctioned to us immediately but in any case not later than 15th December 1968, from the MDF grants.

Delegation of machine tool dealers from abroad

It is proposed to invite a delegation consisting of representatives of user industries and important machine tool dealers and importers from a few countries to India to visit some of our major machine tool factories with a view to acquainting them with the quality and types of machine tools made in India and are available for exports. Such a visit would greatly help the promotion of export of machine tools to the countries from where such delegations are invited. It is proposed that, in the first instance, a delegation of 12 dealers from the USA and Canada, which are amongst the largest importers of machine tools, may be invited. The delegation would visit about 20 major machine tool units in the country. The cost of their air travel and stay in India would be about Rs 2 lakhs (as per statement enclosed). This expenditure of fostering the delegations may be met from the MDF up to 75 per cent and the balance 25 per cent would be met by the Association through contributions from the machine tool units which would be visited by the delegations.

Visit of Indian machine tool delegation abroad

With the object of exploring markets for machine tools and establishing direct contacts with the dealers and users of machine tools, it is proposed to send a delegation of 6 machine tool manufacturers to the USA and Canada in the first place and subsequently to Australia, New Zealand and

South East Asian countries like Philippines, Malayasia and Thailand. The visit of such delegations would enable the Indian manufacturers to understand the specialised needs of machine tool buyers in the countries they visit. The expenses for the American tour are estimated at Rs 80,000 as per details enclosed, out of which 50 per cent may be met from the MDF.

Showrooms Abroad

The Association is planning to open a showroom either in Los Angeles or Chicago to facilitate display of products made by the member-firms. The space in this show room would be offered to the members at a nominal rental for exhibition purposes. The showroom will be equipped with technical staff which would attend to all enquiries on the spot. The estimated cost of the showroom would be Rs 3.25 lakhs per year according to the break-up enclosed. In the initial period of the first five years, the Association would seek 75 per cent of grant from the MDF for the first three years and 50 per cent for the 4th and 5th years, for maintaining this showroom.

Survey of Export Markets

It would be necessary to conduct specific market surveys of the countries with export potential before any large scale export effort is planned. Such surveys would enable us to obtain data on the current and potential demand for machine tools of these countries, special types and specifications of machine tools required by the user industries, pricings, existing channels of distribution available for different types of machine tools, advice on the appointment of distributing agents, designing and other special requirements of the customers, level of promotion and various publicity media, etc. In the first place it is proposed to undertake such surveys in the USA, Canada, Mexico, U.K. and West Germany. The surveys would be entrusted to specialised agents like Global Marketing & Management, USA, Kirloskar Consultants, etc. The estimated cost of these surveys would be to the tune of Rs 4 lakhs. Under the MDF scheme grant up to 75 per cent is available and the Association would seek such assistance from the Government.

Film on the Machine Tool Industry

Preparation of a film depicting the progress made by the machine tool industry and showing the different types of machine tools made in India was considered necessary for the purpose of displaying the same abroad. It was thought that exhibition of such films to selected groups of business people would help in creating a favourable impact about the export potential of the Indian machine tool industry. The film would be of 25 to 30 minutes duration and would be in colour on 35 mm. with commentary. The estimated cost of the film would be Rs 1,50,000. It was proposed to seek assistance up to 100 per cent towards the cost of making this film.

Publicity and Propaganda abroad

As a prerequisite to any worthwhile export drive, the industry will have to undertake aggressive advertising and promotion through the media of newspapers, technical journals, etc. This expenditure would be Rs 10 lakhs for the first year, about Rs 15 lakhs in the second year, Rs 20 lakhs in the third year and about Rs 20 lakhs for subsequent two years. Since the publicity would promote image building, Government assistance to the extent of 75 per cent from the MDF would be required.

The total expenditure proposed under the above export promotion schemes and the grant expected would be as under:

	Total expenditure Rs in lakhs	Grant expected Rs in lakhs
Indian Machine Tool Pavilion at the Paris Fair	8.00	7.20
Delegation of Machine Tool Dealers from USA & Canada	2.00	1.50
Visit of Indian Machine Tool Delegation to USA & Canada	0.80	0.40
Showroom at Los Angeles	3.25	2.45
Survey of Export Markets	4.00	3.00
Film	1.50	1.50
Publicity & Propaganda	10.00	7.50
Total for one year	29.55 Say 30 lakhs	23.55 Say 24 lakhs

Given this aid for financing the sales promotional effort, the industry feels sure that it will be possible to create a proper image of the country's machine tool industry in the international market. This expenditure is to be considered not only in relation to the goal of actualising the export potential for achieving an export figure of Rs 7.5 crores at the end of the Fourth Plan but also the possibilities of continued exports, even at a higher scale, in the years thereafter. In our considered view this investment is definitely worthwhile to make and will pay rich dividend in due course. The selling endeavour jointly made will also be supplemented by the efforts of the individual units who will be on their own in finding a place for them in the export market.

We believe the measures suggested above will go a long way to enable penetration by the Indian machine tool industry in the priority international markets. It may be remembered that even in the advanced countries the machine tool industry has received considerable financial support from the Government for creating strong base for the development of export trade. We shall be grateful if the schemes submitted above are examined by the Ministry and the assistance requested is given at an early date.

Thanking you,

Yours faithfully,

Sd/-

Jayant H. Shah
PRESIDENT

Encls:

Appendix 5 (cont'd)

I.M.T.M.A.

Delegation of Machine Tool Dealers from USA and Canada

Cost Estimates
of visit to India

1. No. of Dealers - 12 (Along with their wives)

2.

Places to be visited in India	Duration
Bombay-Poona Region (Ex-Cell-O - Godrej - Simtools - NSE - Cooper - Telco - Batliboi)	4 days
Delhi Region (DGTD - Commerce Ministry - NSIC - Ameteep - Ashok)	2 days
Ludhiana-Batala Region (Daulat - R.K. Machine - Pearl - Beco)	2 days
Bangalore-Harihar-Coimbatore Region (HMT - Bharat Fritz - Mysore Kirloskar - PSG)	3 days
Calcutta-Ranchi Region (Texmaco - Industrial Plants - HEC)	2 days
Hyderabad Region (HMT - Praga Tools)	1 day
Madras Region	1 day
	15 days

3. a) Air Fare - Chicago-Bombay-Chicago

Economy Class - Rs 9020 x 6 = Rs 54,120.00

b) Air Fare - New York-Bombay-New York

Economy Class - Rs 8460 x 6 = Rs 50,760.00

c) Domestic arrangements
@ Rs 3742 x 24 = Rs 89,808.00

Rs 194,688.00

Appendix 5 (cont'd)

4. Domestic Arrangements		cost per person
a) Air fare for journey Bombay/Poona/Bombay/Delhi/Calcutta/Madras/Hyderabad/Bangalore/Coimbatore/Bombay	...	Rs 1,512
b) Car hire Bangalore/Harihar/Bangalore, inclusive of local running	...	Rs 150
c) Car hire Delhi/Ludhiana/Batala/Delhi	...	Rs 300
d) Car hire in other cities on the basis of 80 miles per day, for 12 days	...	Rs 480
(the above car rates are based on 4 persons to a car)		
e) Hotels in cities excluding Ludhiana, Batala and Harihar	...	Rs 1,300
		Rs 3,742

Note: a) It is proposed to invite the wives of the dealers along with them. The cost of their travel and stay in India will be met by us while the cost of international travel will be borne by them.

b) If the delegation travels by First Class on international sectors, the additional cost would be Rs 66,900 or the total would be Rs 2,61,588.

Appendix 5 (cont'd)

Visit of Indian Machine Tool Delegation to USA, Canada

Estimate of Cost

No. of persons - 6.

Places to be visited - New York - Washington - Montreal
Detroit - Chicago - Los Angeles.

Route of Journey - Via Rome - Zurich - Paris - London - New York.

Air Fare - Economy Class - Rs 10,591 approx. per person.

Duration - 20 days.

Hotel charges - 8 to 20 Dollars - Average of $ 12 or Rs 100 per day per person

Total Cost

Air Fare	...	10591 x 6	=	Rs 63,546
Hotel charges for 20 days	...	100 x 20 x 6	=	Rs 12,000
Misc. expenses	...	...	=	Rs 5,000
		Total	=	Rs 80,546

Appendix 5 (cont'd)

ESTIMATE OF EXPENSES FOR RUNNING A SHOWROOM IN LOS ANGELES

Recurring Expenses		US $
1.	Monthly rental 15 cents per sq.ft. x 5,000 sq.ft.	750
2.	Salary for Manager/Salesman	1000
3.	Salary for Clerk/Typist	450
4.	Auto expense, lease	100
5.	Gas and maintenance	100
6.	Telephone & Post	50
7.	Clearing and handling at Port	50
8.	Janitor, Gas and Electricity Insurance and Office supplies	200
9.	Entertainment	300
		US $ 3000 x 12
		= 36,000

Advertisement charges not included as it depends on the type of promotion proposed. Advertisements is expensive in USA.

Non Recurring Expenditure:		US $
1.	Furniture (2 desks, chairs, file cabinets typewriters, etc)	1000
2.	Neon or lighted overhead-outdoor sign $ 1000 to 5000 or	3000
3.	Plain Painted Sign:	500
4.	Additional furnitures for 4/5 representatives of various companies	3000
		US $7500 = 7,500
		Total: US $ 43,500
		i.e. Rs 3.26 lakhs.

Appendix - 6

Major Machine Tool Exhibitions of Interest to the Indian Machine Tool Industry

Country	Sponsor	Name of Show	Details
U.S.A.	Manager of Expositions American Society of Tool and Manufacturing Engineers 20501 Ford Road Dearborn, Michigan 48128 U.S.A.	*ASTME Show (American Society of Tool and Manufacturing Engineers Tool Exposition)	Annual, five days, beginning of May; Northeast or Great Lakes area of USA; 1968 Show April 29-May 3, Philadelphia, 1969 Show May 5-9, Chicago; Allows participation of foreign manufacturers and trade associations; rental: $6 per square foot; Application deadline: one year in advance
	- ditto -	ASTME/Upper Midwest Tool Exposition	1968 Show, November 12-14, Minneapolis, Minnesota. Regional Show
		ASTME/Midwest Tool Exposition	1969 Show, October 14-16, St Louis, Missouri
		ASTME/Mid-Atlantic Tool Exposition	1969 Show, November 4-6, Baltimore, Maryland
	- ditto - plus American Society for Metals	*WESTEC Show (Western Metal Tool Exposition and Convention)	Annual, five days, March; Los Angeles, California. 1968 Show, March 11-15

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* Show of major interest.

Country	Sponsor	Name of Show	Details
U.S.A. (cont'd)	Manager of Expositions American Society of Tool and Manufacturing Engineers 20501 Ford Road Dearborn, Michigan 48128 U.S.A. plus American Society for Metals	*WESTEC Show (Western Metal Tool Exposition and Convention)	1969 Show, March 10-14. Allows participation of foreign manufacturers and trade associations
	- ditto -	WESTEC/NORTH Show	1968 Show, September, San Francisco, Calif. Regional Show
	National Machine Tool Builders' Association 2139 Wisconsin Ave Washington, D.C. 20007	*NMTBA Show	Every five years until 1970; every two years beginning 1972; 1970 and 1972 Shows, Chicago; No foreign participation allowed through 1970; foreign participation allowed beginning in 1972. Total space: 330,000 sq ft in 1970 600,000 sq ft in 1972
Canada	Industrial and Trade Shows of Canada Maclean-Hunter Ltd 481, University Ave Toronto 2, Canada	*National Industrial Production and Machine Tool Show of Canada	Every two years, five days, in May or June; Toronto; 1967 Show May 1-5, Toronto; 1969 Show June 2-6, Toronto;

Country	Sponsor	Name of Show	Details
Canada (cont'd)		*National Industrial Production and Machine Tool Show of Canada (cont'd)	Allows participation of foreign manufacturers, trade associations, and governments. There is a separate International Pavilion for the displays of foreign governments and trade organizations. Includes production equipment of other types in addition to machine tools. Total space : 12 acres (1967 and 1969) with $ 25 million of equipment shown. Space rental : US $ 2.77 per sq ft. Attendance : Over 45,000 people with influence on purchase decisions.
U.K.	The Machine Tool Trades Association 25-28, Buckingham Gate London SW1, England	*International Machine Tool Exhibition(IMTEX)	1968 Show, 27 June-11 July, Olympia, London, England. Next show to be held in 1972. Participation restricted to members of the MTTA. Does not allow direct participation by foreign manufacturers or trade associations, but allows UK importer-distributors who are members of the MTTA to show foreign machines they handle.

Appendix 6 (cont'd)

Country	Sponsor	Name of Show	Details
West European Continent		*European Machine Tool Exhibition	Every two years, rotates between Hanover, Paris, Milan, Brussels. 1965 Show, Brussels. 1967 Show, Hanover, West Germany. 1969 Show, June 23 to July 2, Paris, France. Does not allow direct participation of non-European manufacturers, although some participate through European subsidiaries. Total space : 1,000,000 sq ft in 1967.
Japan	Tokyo International Trade Fair Commissioner C.P.O. Box 1201 Tokyo, Japan	Japan International Machine Tool Fair	1968: Oct. 2-13, Jarumi, Tokyo. Not of major interest to Indian machine tool industry because market for Indian machine tools in Japan is very limited.

Appendix - 7

Indian Exports of Machine Tools

		(Rs. Lakhs)	U.S. $ ('000)
1956-57		.55	12
1957-58		.29	6
1958-59		.01	0.2
1959-60		.24	5
1960-61		4.10	86
1961-62		9.69	204
1962-63		6.21	130
1963-64		10.52	221
1964-65		16.60	349
1965-66		35.60	748
1966-67	Pre-deval.	41.60	882
	Post-deval.	60.02	799
1967-68		67.00	892
1968-69 (8 months)		104.59	1,392

Source: EEPC

Appendix - 8

Export of Indian Machine Tools by Countries
(Value in '000 Rupees)

Country	1965-66	1966-67	1967-68	1968-69 est (HMT only)
I. North America	218.3	351.4	1206.6	2500
U.S.A.	193.2	280.8	589.1	
Canada	25.1	70.6	617.5	
II. West Europe	265.7	183.2	1166.5	2530
a) E.E.C.	216.0	165.7	508.2	See c)
Netherlands	58.9	-	225.9	
Italy	46.2	-	7.3	
West Germany	110.9	165.7	275.0	
b) United Kingdom	10.0	16.5	628.4	630
c) Others	39.7	1.0	29.9	1900
Austria	27.1	-	-	
Sweden	12.6	1.0	29.9	
III. East Europe	1686.1	3331.6	866.1	280
Bulgaria	-	245.9	-	
Czechoslovakia	1321.1	819.6	-	
East Germany	-	28.6	72.3	
Hungary	-	58.8	72.5	
Poland	365.0	1777.8	288.6	
USSR	-	400.9	432.7	
IV. Australia-New Zealand	144.7	137.4	504.4	1240
Australia	42.4	119.2	191.3	
New Zealand	102.3	18.2	313.1	
V. Japan	24.9	13.2	-	See XI
VI. Latin America	-	-	78.2	See XI
Argentina	-	-	78.2	

Appendix 8 (cont'd)

Country	1965-66	1966-67	1967-68	1968-69 est (HMT only)
VII. Africa except UAR	275.3	647.9	909.3	See XI
Ethiopia	8.7	-	42.3	
Kenya	11.4	183.6	749.7	
Mozambique	-	-	75.0	
Nigeria	249.2	427.1	21.0	
Tanzania	6.0	37.2	21.3	
VIII. West Asia & UAR	180.3	381.7	317.4	See XI
Egypt	42.6	2.3	131.5	
Iran	86.3	309.9	128.1	
Iraq	3.4	35.2	2.5	
Lebanon	15.8	24.9	10.6	
Saudi Arabia	5.2	9.4	44.7	
Turkey	27.0	-	-	
IX. South Asia	294.4	44.6	220.5	2500
Burma	-	-	22.8	
Ceylon	35.9	30.5	197.0	2500
Nepal	234.8	14.1	0.7	
Pakistan	23.7	-	-	
X. South East & East Asia (excl. Japan)	439.6	886.6	1237.8	See XI
Formosa	14.5	-	-	
Malaysia	114.5	24.6	14.6	
Phillipines	27.8	70.0	118.3	
Singapore	-	-	87.6	
South Vietnam	213.2	536.1	614.2	
Thailand	69.6	255.9	403.1	
XI. Others	29.5	24.8	193.7	950
Total:	3558.8	6002.4	6700.5	1000

Appendix - 9

Export of Indian Machine Tools by Type, 1964-68
(Value in US $)

Name of Machine	1964-65 No.	1964-65 Value	1964-65 Ave.Value per M/C	1965-66 No.	1965-66 Value	1965-66 Ave.Value per M/C	1966-67 No.	1966-67 Value	1966-67 Ave.Value per M/C
GRAND TOTAL	608	217,775	358	690	384,342	557	674	921,460	1,367
I. Turning Machines	114	166,428	1,460	99	101,634	9,811	139	88,492	637
Turret Lathes	-	-	-	2	17,896	8,948	-	-	-
Lathes, Centre, Tool-room, N.E.S.	114	166,428	1,460	97	83,738	863	139	88,492	637
II. Milling Machines	-	-	-	24	36,330	1,513	132	456,735	3,460
III. Drilling Machines	3	5,232	1,744	59	163,094	7,918	70	248,903	7,773
Pillar & Column	-	-	-	4	797	196	-	-	-
Radial	-	-	-	17	75,393	4,435	22	145,676	6,622
N.E.S.	3	5,232	1,744	38	86,904	2,287	48	103,227	2,151
IV. Grinding, Honing, Lapping & Polishing	65	7,909	122	52	11,313	1,700	67	25,027	4,853
Grinding, Plane & Cylinder	65	7,909	122	8	954	119	6	901	150
Surface Grinder	-	-	-	4	3,449	862	-	-	-
Tool & Cutter Grinders	-	-	-	21	1,143	54	1	4,051	4,051
N.E.S. Grinders	-	-	-	12	2,658	221	32	14,394	449
Lapping, Honing, Polishing	-	-	-	7	3,109	444	28	5,681	203
V. Boring Machines	-	-	-	4	5,221	1,305	-	-	-
VI. Planing, Shaping & Slotting	21	12,288	585	13	16,763	1,975	24	27,647	3,610
Planing	-	-	-	2	1,103	551	1	2,517	2,517
Shaping	21	12,288	585	11	15,660	1,424	23	25,130	1,093
Slotting	-	-	-	-	-	-	-	-	-

Appendix 9 (cont'd)

	Name of Machine	1964-65			1965-66			1966-67		
		No.	Value	Ave.Value per M/C	No.	Value	Ave.Value per M/C	No.	Value	Ave.Value per M/C
VII.	Cut-off & Sawing	8	2,370	744	147	21,728	1,168	90	11,442	516
	Cut-off M/Cs	-	-	-	5	4,605	921	-	-	-
	Bandsaw(Metal Cutting)	1	473	473	69	15,322	222	2	791	395
	Circular Saws	-	-	-	-	-	-	-	-	-
	Other Sawing & Fitting	7	1,897	271	73	1,801	25	88	10,651	121
VIII.	Tapping M/Cs	-	-	-	1	131	131	-	-	-
IX.	Presses	76	15,317	588	44	29,384	668	-	-	-
	Presses	20	9,793	489	44	29,384	668	-	-	-
	Inclinable Presses	-	-	-	-	-	-	-	-	-
	N.E.S. Presses	56	5,524	99	-	-	-	-	-	-
X.	Bending & Forming M/Cs	3	478	159	-	-	-	1	224	224
XI.	Punching & Shearing M/Cs	1	544	544	2	53	26	46	4,964	130
XII.	Other Metal Forming	-	-	-	24	530	525	10	6,482	648
	Hammers	-	-	-	24	5	Neg	-	-	-
	N.E.S. Metal Forming	-	-	-	1	525	525	10	6,482	648
XIII.	N.E.S. Metal Working	317	7,211	23	248	3,382	14	95	51,544	543

Name of Machine	1967-68			April'68 - August'68		
	No.	Value	Ave.Value per M/C	No.	Value	Ave.Value per M/C
GRAND TOTAL	3,386	841,198	248	1,034	550,478	532
I. Turning Machines	377	331,505	879	119	215,954	7,718
Turret Lathes	-	-	-	2	11,948	5,974
Lathes, Centre, Tool-room, N.E.S.	377	331,505	879	117	204,006	1,744
II. Milling Machines	55	226,960	4,127	20	90,000	4,500
III. Drilling Machines	100	69,514	5,553	88	132,218	6,191
Pillar & Column	1	1,465	1,465	1	625	625
Radial	6	21,529	3,588	13	59,741	4,595
N.E.S.	93	46,520	500	74	71,852	971
IV. Grinding, Honing, Lapping & Polishing	355	44,142	3,779	530	35,603	14,061
Grinding, Plane & Cylinder	6	12,177	2,030	1	6,497	6,497
Surface Grinder	4	2,240	560	4	11,971	2,993
Tool & Cutter Grinders	1	839	839	4	14,157	3,539
N.E.S. Grinders	310	19,040	61	514	5,829	11
Lapping, Honing, Polishing	34	9,846	289	7	7,149	1,021
V. Boring Machines	-	-	-	-	-	-
VI. Planing, Shaping & Slotting	50	41,704	834	15	18,628	5,360
Planing	-	-	-	1	2,920	2,920
Shaping	50	41,704	834	6	11,443	1,907
Slotting	-	-	-	8	4,265	533

Appendix 9 (cont'd)

	Name of Machine	1967-68			April'68 - August'68		
		No.	Value	Ave.Value per M/C	No.	Value	Ave.Value per M/C
VII.	Cut-off & Sawing	2,236	25,359	167	19	5,744	1,942
	Cut-off M/Cs	-	-	-	1	572	572
	Bandsaw (Metal Cutting)	2,217	22,375	10	3	3,165	1,055
	Circular Saws	-	-	-	12	1,415	118
	Other Sawing & Fitting	19	2,981	157	3	592	197
VIII.	Tapping M/Cs	3	1,769	590	-	-	-
IX.	Presses	103	21,243	206	47	6,651	921
	Presses	103	21,243	206	-	-	-
	Inclinable Presses	-	-	-	12	3,804	325
	N.E.S. Presses	-	-	-	35	2,847	596
X.	Bending & Forming M/Cs	2	335	167	2	321	161
XI.	Punching & Shearing M/Cs	33	12,174	369	15	2,694	179
XII.	Other Metal Forming	19	55,889	4,991	1	3,261	3,261
	Hammers	1	1,997	1,997	-	-	-
	N.E.S. Metal Forming	18	53,892	2,994	1	3,261	3,261
XIII.	N.E.S. Metal Working	53	10,607	200	17	11,964	704

Appendix - 10

Indigenous Production & Imports of Machine Tools - 1961-1965

(Quantities in Numbers)

Code	Type of Machine Tool		1961 Production	1961 Imports	1961 Total	1962 Production	1962 Imports	1962 Total	1963 Production	1963 Imports	1963 Total	1964 Production	1964 Imports	1964 Total	1965 Production	1965 Imports	1965 Total
01	Automatics		-	67	67	-	109	109	-	65	65	65	134	199	182	35	217
02	Boring		-	340	340	-	289	289	16	414	430	31	444	475	22	456	478
03	Broaching		-	18	18	-	13	13	-	36	36	-	30	30	-	35	35
04	Drilling		951	811	1,762	1,305	977	2,282	1,493	692	2,185	2,321	490	2,811	5,107	499	5,606
05	Gear Cutting		-	76	76	-	131	131	-	150	150	-	249	249	3	144	147
06	Grinding		1,008	2,560	3,568	1,202	2,540	3,742	1,245	2,671	3,916	1,469	1,814	3,283	2,025	2,697	4,722
08	Lapping and Honing		-	66	66	-	59	59	3	54	57	45	127	172	20	165	185
22.36	Polishing		41	88	129	56	132	188	50	56	106	74	43	117	25	16	41
09	Capstans and Turrets		31	498	529	56	560	616	97	438	535	160	354	514	274	381	655
10	Lathes		3,970	1,055	5,025	4,687	940	5,627	5,364	1,258	6,622	5,779	908	6,687	5,585	861	6,446
11	Milling		495	549	1,044	608	683	1,291	703	581	1,284	985	644	1,629	1,382	688	2,086
12	Planing		62	38	100	88	39	127	128	54	182	127	64	191	156	53	209
13	Presses		995	804	1,799	1,122	622	1,744	658	897	1,555	734	461	1,195	986	922	1,908
14	Sawing		412	318	730	541	246	787	474	143	617	467	139	606	548	361	909
15	Shaping		294	51	345	476	27	503	500	28	528	735	24	759	719	72	791
16/17	Shearing and Sheet Metal		202	689	891	95	340	435	241	370	611	241	210	451	194	311	505
18	Slotting		43	102	145	47	60	107	81	58	139	68	20	88	83	83	166
19	Screwing		-	62	62	-	57	57	-	31	31	3	100	103	29	69	98
20	Threading		-	219	219	-	248	248	-	134	134	3	57	60	-	220	220
22.15	Hammers		7	50	57	10	62	73	25	92	117	42	43	85	49	65	114
22.22	Tapping		-	92	92	-	176	176	-	41	41	-	71	71	-	98	98
22.23	Bending Other Than Rolls		-	132	132	-	280	280	-	187	187	5	171	176	8	415	423
	Sub-Total	..	8,511	8,683	17,194	10,293	8,590	18,883	11,058	8,500	19,558	13,354	6,597	19,951	15,399	8,642	24,041
	Not Elsewhere Specified		-	3,237	3,237	-	2,116	2,116	-	1,899	1,899	16	1,053	1,069	24	1,000	1,024
	GRAND TOTAL	..	8,511	11,920	20,431	10,293	10,706	20,999	11,058	10,399	21,457	13,370	7,650	21,020	15,423	9,642	25,065

Source: (1) Import figures from Monthly Statistics of the Foreign Trade of India. (2) Indigenous production figures availed from Directorate General of Technical Development.

Appendix - 11

Indigenous Production and Imports of Machine Tools - 1966-1967
(Value in Million Rupees)

Code	Type of Machine Tool	1966						1967					
		Production		Imported		Total		Production		Imported		Total	
		Numbers	Value	Numbers	Value	Numbers	Value	Numbers	Value	Numbers	Value	Numbers	Value
01	Automatics	165	3.174	54	12.657	219	16.371	145	8.678	29	6.374	174	15.052
02	Boring	52	7.651	307	36.557	359	44.188	28	5.194	325	46.695	353	51.889
03	Broaching	-	-	19	4.657	19	4.657	-	-	42	4.638	42	4.638
04	Drilling	2,249	23.370	294	12.247	2,543	35.617	1,366	14.769	284	27.300	1,650	42.069
05	Gear Cutting	18	0.828	175	7.542	193	8.370	9	0.385	102	6.019	111	6.404
06	Grinding	1,859	22.151	1,826	61.425	3,685	83.576	1,421	11.037	942	64.016	1,363	75.053
08	Lapping and Honing }	356	1.755	205	3.442	561	5.197	369	2.112	93	7.594	462	9.706
22.66	Polishing }												
09	Capstans and Turrets	392	19.186	272	15.704	664	34.890	355	12.241	91	8.026	446	25.267
10	Lathes	5,892	82.174	546	50.622	6,438	132.796	4,901	65.762	449	54.732	5,350	120.494
11	Milling	1,091	48.022	523	46.686	1,614	94.708	1,165	42.134	344	21.822	1,509	63.956
12	Planing	179	6.290	50	12.338	229	18.628	159	7.253	20	2.747	179	10.000
13	Presses	877	9.577	553	45.479	1,430	55.056	977	10.285	277	30.567	1,254	40.852
14	Sawing	406	2.946	217	4.201	623	7.147	345	1.933	324	2.877	669	4.810
15	Shaping	734	8.135	75	1.538	807	9.673	559	5.549	45	0.445	604	5.994
16/17	Shearing & Sheet Metal	294	3.684	150	8.242	434	11.928	293	5.710	117	6.966	410	12.676
18	Slotting	83	2.072	29	1.437	112	3.509	108	2.290	-	-	108	3.290
19	Screwing	22	0.276	18	1.336	40	1.612	53	0.215	49	4.731	118	6.949
20	Threading	-	-	152	8.706	152	8.706	-	-	56	2.003	56	2.003
22.15	Hammers	56	3.721	148	8.037	204	11.758	57	1.852	14	3.163	51	5.015
22.22	Tapping	-	-	41	0.419	41	0.419	-	-	20	0.331	20	0.331
22.25	Bending Other Than Rolls	12	0.105	151	10.562	163	10.667	8	0.470	48	2.390	56	2.860
	TOTAL ..	14,737	245.657	5,803	353.814	20,530	599.471	12,278	203,769	3,651	303,536	15,929	509,308
715.9000/19	Other Metalworking Machines, NES	152	11.093	1,165	26.428	1,297	37.521)	52	12.085	2,660	60.739	2,712	72.824
715.8900	Metalforming Machines, NES	62	1.042	441	30.151	503	31.173)						
	TOTAL, NES ..	194	12.135	1,606	56.559	1,800	68.694	52	12.085	2,660	60.739	2,712	72.824
	GRAND TOTAL ..	14,931	257.792	7,409	410.373	22,330	668.165	12,330	215.854	6,311	364.275	18,641	580.129
	Average Price:												
	Pre-devaluation, Jan-May 1966			4,228	175.400								
	Post-devaluation, June-Dec 1966			5,181	285.000								

Sources: (1) Import figures from Monthly Statistics of the Foreign Trade of India. (2) Indigenous production figures availed from Directorate General of Technical Development.

Appendix - 12

TYPE & RANGE OF PRODUCTS WITH CURRENT MARKET PRICES OF INDIAN MANUFACTURES

Sl. No.	Name of Manufacturer	Product	Make/Model	Specification	Approx. price FOR nearest R.H. Rs
PUBLIC SECTOR					
1.	Heavy Engineering Corpn, Ranchi-4	Centre Lathe	LC/100/3000	Swing over bed 1000 mm. Height of centres above bed 500 mm. Distance between centres: 3,000 mm (max weight of workpiece: 10 ton) - Main motor : 40 kW	512,886
2.	- do -	Vertical boring & turning mill	BV 12	Max swing with side arm: 1250 mm, Max swing with LH rail arm: 1350. Max distance tool holder of LH rail arm to table: 1,000 mm. Dia of table: 1180 mm	299,256
3.	- do -	Horizontal boring and facing machine	BH-100	Clamping surface of table: 1250 x 1250 mm. Spindle dia: 100 mm. Max dia of boring: 600 mm. Max dia of facing: 900 mm. Main motor - 10 kW.	232,523
4.	- do -	Radial drilling machine	DR-8	Drilling capacity in steel: 80 mm. Boring capacity in steel: 300 mm. Thread cutting capacity in steel: 1175 mm. Spindle to col. sleeve: 2575 mm. Drilling motor - 7.5 kW.	92,174
5.	- do -	Planing machine	PD-16/4000	Planing width: 1600 mm. Planing length: 4000 mm. Planing height: 1600 mm.	572,662
6.	Hindustan Machine Tools Ltd., Bangalore 31	Centre lathe	Hindustan LB 17	Centre height: 170 mm. Swing over bed: 350 m. Distance between centres: 700 mm. Spindle speeds (IS) 45-2000 or 42-7000. Main motor: 10 HP or 7 HP.	23,500 (ex-works)
7.	- do -	Centre lathe	Hindustan LB 20	Swing over bed: 410 mm (16.1/8"). Swing over carriage: 230 mm (9"). Max distance between centres: 1000 mm (39.3/8"). Spindle speeds (18 or 10), 32-1600 or 16-800 RPM. Main motor 10 or 7 HP.	27,450
8.	- do -	Centre lathe	Hindustan LB 25	Centre height: 250 mm, Swing over bed:500 mm. Distance between centres: 3000 mm. Spindle speeds (18) 32-1600 RPM or 16-800 RPM. Main motor: 10 HP or 7 HP.	40,500 (ex-works)
9.	- do -	Centre lathe	Hindustan H-22	Swing over bed: 460 mm (18"). Max distance between centres 1000 mm. (39.3/8"). Spindle speeds (16) 40-2000 or 20-1000 RPM. Main motor: 12.5 or 7.5 HP.	43,850

Sl. No.	Name of Manufacturer	Product	Make/Model	Specification	Approx. price FOR nearest R.H. Rs
10.	Hindustan Machine Tools Ltd., Bangalore 31	Centre lathe	Hindustan L45U	Swing over gende ways: 925 mm. Height of centres: 450 mm. Spindle speeds (21): 4.5 to 450 RPM. Main motor: 25 HP, 1500 RPM.	197,000
11.	- do -	Centre lathe	Hindustan H-26	Swing over bed: 530 mm (20.7/8"). Max. distance between centres: 3000 mm (118"). Spindle speeds (16) 40-2000 or 20-1000 RPM. Main motor: 12.5 or 7.5 HP.	54,200
12.	- do -	Turret lathe	Hindustan L-22 TP	Max bar capacity 63 mm (2½"). Swing over bed: 480 mm (18.7/8"). Swing over cross slide 290 mm (11.7/16"). Max distance between spindle nose and turret face: 1185 mm (46.5/8"). Spindle speeds (12): 32-1400 RPM. Main motor: 12.5 HP.	54,150
13.	- do -	Turret lathe	Hindustan M2H	Table size: 1100 x 310 mm. Long traverse: 650 mm. Cross traverse: 235 mm. Vertical traverse: 420 mm. Spindle speed (18): 34-635 or 68-1270 RPM. Main motor: 5.5 kW.	45,000 (ex-works)
14.	- do -	Horizontal milling m/c	Hindustan EH2 (electrically controlled)	Table long travel 700 mm (27½"). Work table size: 1150 x 300 mm (45¼ x 11¾"). Spindle speeds (18) 35.5-1800 RPM. Main motor: 7.5 HP.	65,500
15.	- do -	Horizontal milling m/c	Hindustan FH3 (electrically controlled)	Table size: 1600 x 355 mm. Long traverse: 1200 mm. Cross traverse: 320 mm. Vertical traverse: 425 mm. Spindle speed (18) 35.5 - 1800 RPM. Spindle motor:	84,600 (ex-works)
16.	- do -	Vertical milling machine	Hindustan M2V	Table long. Travel 650 mm (25½"). Work table size: 1100 x 310 mm (43¼" x 12¼"). Spindle speeds (18) 34-635 RPM. Main motor: 5.5 kW.	50,500
17.	- do -	Vertical milling machine	Hindustan EV2 (electrically controlled)	Table size: 1100 x 300 mm. Long traverse: 700 mm. Cross traverse: 280 mm. Vertical traverse: 400 mm. Spindle speeds (18): 35.5 - 1800 or 56-2800 RPM. Spindle motor: 7.5 or 10 HP.	66,500 (ex-works)
18.	- do -	Universal milling machine	Hindustan M2U	Table long. travel 650 mm (25½"). Work table size: 1100 x 275 mm (43¼" x 10¾"). Spindle speeds (18) 34-635 RPM. Main motor: 7.4 HP.	48,500
19.	- do -	Universal milling machine	Hindustan FU2D (electrically controlled)	Table size: 1350 x 300 mm. Long traverse: 850 mm. Cross traverse: 280 mm. Vertical traverse: 370 mm. Spindle speeds (18): 35.5 - 1800 RPM. Spindle motor - 8.5 kW.	86,800 (ex-works)

Sl. No.	Name of Manufacturer	Product	Make/Model	Specification	Approx price FOR nearest R.H.
20	Hindustan Machine Tools Ltd Bangalore 31	Vertical milling machine	Hindustan FV 3	Table long. travel 1200 mm (47½"). Work table size 1300 x 355 mm (63" x 14"). Spindle speeds (18) 35.5 - 1800 RPM. Main motor 10 HP	89,400
21	- do -	Radial drilling machine	Hindustan RM 60	Drilling capacity in steel 50 mm (2"), Max drilling radius 925 mm (36½"). Working surface to base plate 1050 x 800 mm (40½" x 31½"). Spindle speeds (12) 40-4,700 or 50-2100 RPM. Main motor 5/6 HP	57,500
22	- do -	Radial drilling machine	Hindustan RM-82	Drilling capacity in steel: 75 mm. Boring capacity in steel: 250 mm. Max drilling radius: 2500 mm. Main motor 10 HP	78,600 Ex-works
23	- do -	Cylindrical grinding machine	Hindustan G 13-300	Max dia ground with standard wheel 260 mm (10¼"). Admits between centres 355 mm (13"). Standard grinding wheel (dia x width) 300 x 40 mm (12 x 1½"). Main motor (wheel head) 5 HP	43,250
24	- do -	Cylindrical grinding machine	Hindustan G 17-500	Max dia ground with standard wheel 350 mm (13¾"). Admits between centres 625 mm (25"). Standard grinding wheel (dia x width) 500 x 60 mm (20 x 2-3/8"). Main motor (wheel-head) 7.5 HP	60,000 Ex-works
25	- do -	Cylindrical grinding machine	Hindustan G 22-2000	Max dia ground 450 mm, Admit between centres: 2075 mm. Standard grinding wheel 1500 x 60 mm (20 x 2-3/8"). Main motor (wheel-head) 7.5 HP	80,000 Ex-works
26	- do -	Surface grinding machine	Hindustan SFW2	Working surface: 250 x 1500 mm. Maximum grinding length 1500 mm, Max grinding height 400 mm. Wheel size: max 300 mm dia. Wheel speed: 1400/2800 RPM. Total power: 10 HP	102,800 Ex-works
27	- do -	Spur & Helical gear cutting machine	Hindustan Maxi-Cut 2A	Max module 4. Max DP 6. Max dia spur/helical gear 178/165 mm (7/6½"). Max face width ext/int 50/25 mm (2/1"). Main motor 2 HP	50,350
28	- do -	Special purpose 6-station rotary indexing machine	Hindustan	Station No.1 - Load and Unload. Station No.2 - Clamp-horz Drilling Unit S III. Drill and chamfer 2 holes 9 mm Ø x 12 mm Ø x 19.8 mm deep. Station No. 3 - Horz Drilling Unit S III - Drill 2 holes 6 mm Ø x 41.7 mm deep. Station No. 4 - Vert milling unit with 2 spindles mill 2 slots 6.2 mm wide x 6 mm deep. Station No.5 - Horz Drilling Unit S III - Drill 2 holes 6.6 mm Ø 61.6 mm dee Station No.6 - Horz Tapping Unit III - Tap 2 holes 10 mm x 1.6 mm deep and vert drilling unit S III Drill 2 holes 5.5 mm Ø thro.	

Sl. No.	Name of Manufacturer	Product	Make/Model	Specification	Approx. price FOR nearest R.H. Rs
29.	Praga Tools Ltd., Secunderabad	Drilling machine	Praga 313	Drilling capacity in steel 13 mm (½"). Spindle taper No. 2 Morse. Spindle speeds 5 (440-4700 rpm). Main motor: 0.5 HP.	
30.	-do-	Drilling machine	Praga 525	Drilling capacity 25 mm (1"). Spindle taper No. 3 morse. Working surface of table 343 x 343 mm (13½ x 13½"). Spindle speeds 8 (180 x 1020 rpm). Main motor: 1 HP.	
31.	Praga Jones & Shipman	Grinding machine	Jones & Shipman Model 310	Tool & cutter grinder 305 mm swing x 480 CC.	24,165
32.	-do-	Grinding machine	Jones & Shipman Model 540 H Hand operated surface grinder Jones & Shipman Model 540 Hydraulic operated surface grinder	150 mm x 450 mm tank	31,865
33.	Praga Gambin Milling Machines	Universal Milling machine		229 mm x 1000 mm	56,500
34.	Prototype Production & Training Centre Okhla	Press brakes, centre lathes, tool and cutler grinder	Type SSSC 280/Model-001 Precision tool room lathe	Swing over bed: 280 mm, swing over saddle: 245 mm, distance between centres: 800 mm, length of bed 1380 mm. Motor: 1.5 HP.	13,950
35.	-do-	Press brakes, centre lathes, tool and cutler grinder	PTC-OKHLA-Universal Tool & Cutler Grinder	Longitudinal traverse of table: 400 mm, cross traverse of table: 250, dia of wheels upto 175 mm. Spindle speeds 3000 & 6000 rpm.	20,500
PRIVATE SECTOR					
1.	Acme Manufacturing Co. Ltd., Bombay	Shaping machine, cone pulley lathes	COOPER SHAPERS AS - MODEL	Stroke 12", 20" & 24"	
2.	Addison & Co. Ltd., Madras	Tool & cutter grinding machines	Addison TC-30	Swing over table: 200 mm (8") Max distance between centres: 230 mm (9") Max dia of grinding wheel: 100 mm (4") Main motor: 0.5 HP.	-
3.	-do-	Shaping & slotting machines drill point grinder	Addison DC-25	Min/Max size of drill: 3/25 mm (1/8" to 1") Min/Max included angle: 90°/150° Size of wheel (dia x width): 150 x 32 mm (6 x 1¼") Main motor: 1 HP.	-
4.	Amar Machine Tools Private Ltd., Ludhiana	Centre lathes	Amar CB-1	Swing over bed: 286 mm (11¼") Swing over carriage: 165 mm (6½") Max distance between centres: 508 mm (20") Spindle speeds (12): 34-1200 rpm Main motor: 1 HP.	4,600
5.	-do-	Centre lathes	Amar MT-1	Swing over bed: 330 mm (13") Swing over carriage: 209 mm (8¼") Max distance between centres: 610 mm (24") Spindle speeds (8): 50-1000 rpm Main motor: 1.5 HP.	5,800

Sl. No.	Name of Manufacturer	Product	Make/Model	Specification	Approx price FOR nearest R.R. Rs
6.	Amar Machine Tools Private Limited, Ludhiana	Shaping and slotting machines	Amar Cooper AS-24	Max stroke: 610 mm (24") Range of strokes per minute: 12-75 Main motor : 3 HP	10,504
7.	Ameteep Machine Tools Private Ltd, Delhi 6	Shearing machines	Ameteep SCTP (SZ) 6.3/3150	Cutting capacity (MS plate): 6.3 x 3150 mm (¼" x 125"), Strokes per minute 22, Driving motor 12 HP	-
8.	Ameteep Machine Tools Private Ltd, Delhi 6	Shearing machines	Ameteep SCTP (SZ) 3.15/2500	Cutting capacity (MS plate):3.15 x 2500 mm (1/8" x 98½"), Strokes per minute 45, Driving motor 5 HP	-
9.	- do -	Power press mechanical	Ameteep Big 'C' series	Max tonnage 75 T. Max stroke 127 mm (5") Die area (LR x FB) 620 x 900 mm (24½ x 35½") Main motor 7.5 HP	37,710
10.	- do -	Power press mechanical	Ameteep 100 T	Max tonnage 100 T. Max stroke 250 mm (10") Die area (LR x FB) 610 x 760 mm (24 x 30") Main motor 10 HP	-
11.	- do -	Power press mechanical	Ameteep 40 T	Capacity 40 T. Max stroke (blank holder) 127 mm (5"). Max stroke (punch holder) 255 mm (10"). Die area (LR x FB) 525 x 485 mm (20½ x 19"). Main motor 7.5 HP	-
12.	Atlas Works Limited	Power presses, Sheet metal working machinery	ATLAS	Inclinable power presses, 2½ tons to 40 tons capacity. Vertical power press, 5 tons to 30 tons capacity. Power guillotine shearing machines, 36" x 48"	919 to 11,025 1,260 to 8,575 2,625 & 5,500
13.	Batala Engineering Co Ltd Batala	Centre lathes	Beco Graziano SAG-180	Swing over bed: 362 mm (14¼"). Swing over carriage - 219 mm (8-5/8"). Max distance between centres: 1000 mm (39-3/8"). Spindle speeds (9/12): 45-1500 or 54-1800 rpm. Main motor: 5 HP	21,000
14.	- do -	Centre lathes	Beco G1-185	Swing over bed: 370 mm (14½"). Swing over carriage 235 mm (9¼"). Max distance between centres : 1000 mm (39-3/8"), 35-1214 rpm. Main motor: 3 HP	8,936

Sl. No.	Name of Manufacturer	Product	Make/Model	Specification	Approx price FOR nearest R.S. Rs
15.	Batala Engineering Company Limited Batala	Open side hydraulic planing machines	Farretto-Beco P-5000	Table size: 3000 x 620 mm (118½" x 24½"). Max width of work piece: 750 mm (29½"). Max height of work piece: 650 mm (25½"). Max length of stroke: 3000 mm (118½"). Table cutting speeds: 4-40 mpm (13-132 fpm). Main motor 15 or 20 HP	199,000
16.	- do -	Double housing planing machine	Beco PL-6	Planing size 1800 x 900 (72" x 34"), Motor 8 HP	25,500
17.	Batliboi & Company (P) Ltd Bombay	Milling machine (Universal)	Batliboi Tapti	Table longitudinal travel 520 mm (20"). Work table size 868 x 195 mm (33-3/8" x 7-5/8"). Spindle speeds (12) 90 - 1100 rpm, Main motor 5.5 HP	27,300
18.	- do -	Horizontal milling machine	Batliboi FA-3	Table longitudinal travel 800 mm (32"). Work table size 1250 x 300 mm (50 x 11¾"). Spindle speeds (12) 45 - 2000 rpm. Main motor 2 HP	44,000
19.	- do -	Radial drilling machine	Batliboi VR-2	Drilling capacity in steel 32 mm (1¼"). Spindle taper No. 3 Morse. Maximum drilling radius 1820 mm (72-5/8"). Working surface of base plate 780 x 850 mm (31-1/8" x 34"). Spindle speeds (12) 90 - 4500 rpm. Main motor 2 HP.	26,750
20.	- do -	Radial drilling machine	Batliboi VR-4	Drilling capacity in steel 50 mm (2 "). Spindle taper No. 4 Morse. Maximum drilling radius 2830 mm (112"). Working surface of base plate 1475 x 900 mm (57½" x 35½"). Spindle speeds (12) 45 - 2000 rpm, Main motor 5 HP	84,000
21.	Beegee Corporation, Patiala	Hydraulic Presses			
22.	Bharat Fritz Werner Private Limited Bangalore 22	Horizontal milling machine	Bharat Fritz Werner FH-1	Table long. travel 560 mm (22"). Work table size 1000 mm x 225 mm (39-3/8" x 9"). Spindle speeds (8) 56-1400 or 140 -3550 rpm. Main motor 4 HP	26,250
23.	- do -	Vertical milling machine	Bharat Fritz Werner FV-1	Table long. travel 560 mm (22"). Work table 22". Work table size 1000 x 225 mm (39-3/8" x 9"). Spindle (8) 56-1400 or 140-3550 rpm, Main motor 4 HP	27,250
24.	Chanana Bros, New Delhi	Centre lathes	IEC	Swing over carriage 250 mm. Distance between centres 1500 mm. Spindle speeds (12) 27-1000 rpm. Main motor 3 HP	16,900
25.	Cooper Engineering Limited Chinchwad.	Vertical boring and turning machine	Cooper-Schiess 13 EK 105	Work table dia 1000 mm (40"). Max dia turned 1250 mm (50"). Table speeds (12) 10.2-160 rpm. Main motor 40 HP	330,000 + 130,000 (Spl Acc)

Sl. No.	Name of Manufacturer	Product	Make/Model	Specification	Approx. price ROR nearest R.H.
26.	Cooper Engineering Limited, Chinchwad	Vertical boring and turning machine	Copper Schiess 12 EK 85	Work table dia 800 mm (32"). Mas dia turned 1000 mm (40"). Table speed (12) 12-200 rpm. Main motor : 25 HP.	-
27.	Cooper Engineering Limited, Chinchwad	Double housing planing machine	Cooper loudon DH-4	Table size (LxW) 3000 x 1000 mm (120 x 40"). Max width of work piece 1220 mm (48"). Max height of work piece 1220 mm (48"). Max length of stroke 3000 mm (120"). Table cutting speeds up to 76.2 mpm (up to 250 fpm). Main motor:30 HP.	492,703
			DM-3-08	Planing with 915 mm. Std. stroke 2440 mm. Max height of job 915 mm. Cutting speed 30-150 fpm. Main motor: 15 HP.	240,000
			DM-4-10	Planing width 1220 mm. Std. stroke 3050 mm. Max height of job 1220 mm. Cutting speed 30-150 fpm. Main Motor: 20 HP.	295,400
28.	-do-	Spur & helical gear cutting machine	Copper Pfauter P251E1	Max module of hob 4. Max DP 6. Max dia of spur gear 250 mm (10"). Max face width of gear 220 mm (8¾"). Main motor: 7.5 HP.	-
29.	-do-	Shaping machine	Coper CSM-63	Max stroke 630 mm (24¾"). Range of strokes per minute 10.80. Main motor:3 HP.	10,300
			RGP-28	Stroke: 710 mm. Ram cycles per min 9 to 100. Main motor: 10 HP.	52,500
30.	-do-	Shaping machine	Cooper CSH-63	Max stroke 630 mm (24¾"). Range of strokes per minute 8-125. Main motor drive: 7.5 HP.	-
31.	-do-	Shaping machine	Cooper AS-18	Max stroke 405 mm (16"). Range of strokes per minute 28-73. Main motor: 2 HP.	-
32.	-do-	Slotting machine	Cooper Hov CH-16	Max stroke 160 mm (6. 5/16"). Range of strokes per minute 71-180. Main drive motor: 2 HP.	13,635
33.	-do-	Slotting machine	Cooper Hov CH-40	Max stroke 406 mm (15¾"). Range of strokes per minute 11.2-71. Main drive motor: 12 HP.	70,300
34.	-do-	Slotting machine	Cooper CH-25	Max stroke 250 mm (10"). Range of strokes per minute 22-112. Main drive motor: 6.1 HP.	40,700

Sl. No.	Name of Manufacturer	Product	Make/Model	Specification	Approx. price FOR nearest R.H. Rs
35.	Crescent Iron & Steel Co. Ltd., Bombay	Metal cutting band saw, hydraulic process	CISCO-O-50 T hydraulic press CISCO BAND SAW	Max capacity 50 tons, ram dia 127 mm, max ram travel 203 mm, job dia 150 mm	5,920 3,400
36.	Damodar Enterprises Ltd., Calcutta	Power presses; spring type power hammers			
37.	Daulat Industrial Corpn. Ltd., Ludhiana	Centre lathe	Daulat MCN-1	Swing over bed 400 mm (15¾"). Swing over carriage 250 mm (9.1/16"). Max distance between centres 1000 mm (39.3/8"). Spindle speeds (6) 28-512 rpm. Main motor: 2 HP.	-
38.	-do-	Centre lathe	Daulat MCS-1	Swing over bed 400 mm (15¾"). Swing over carriage 240, (9.1/16"). Max distance between centres 1000 mm (39.3/8"). Spindle speeds (6) 28-512 rpm. Main motor: 2 HP.	-
39.	-do-	Centre lathe	Daulat Student-1000	Swing over bed 400 mm (15¾"). Swing over carriage 240 mm (9½"). Max distance between centres 1000 mm (39.3/8"). Spindle speeds (12) 31-1000 rpm. Main motor: 5 HP.	-
40.	-do-	Centre lathe	Daulat WS/200/10	Swing over bed 400 mm (15¾"). Swing over carriage 250 mm (9.7/8"). Max distance between centres 1000 mm (39.3/8"). Spindle speeds (21) 15-1263 rpm. Main motor: 7.5 HP.	16,250
41.	-do-	Shaping machine	Daulat CL-400	Max stroke 450 mm (18"). Range of strokes per minute 22-90. Main motor: 2 HP.	5,900
42.	Delhi Iron & Steel Co. Pvt. Ltd., Ghaziabad	Cone pulley lathes			
43.	Engineering & Industrial Foundry Co., Coimbatore	Pillar drilling machine	EIFCO F-4/38	Drilling capacity in steel 38 mm. Tapping capacity in steel: 20 mm. Spindle to col. 311 mm. Spindle to table: 457 mm. Spindle to base: 940 mm. Motor: 2 HP.	5,690
44.	-do-	Bench drilling machine	EIFCO BDM/UR	Drilling capacity in steel: 9.5 mm. Chuck to table: 286 mm max. Motor: 0.8 HP.	2,900
45.	-do-	Pedestal Grinder	EIFCO MG 24	Grinding wheel: 610 mm. Wheel speeds: 955, 1146 and 1432 rpm. Motor: 2 x 7.5 HP.	9,266
46.	-do-	Drilling machine	Petler P 4/38	Drilling capacity in steel 38 mm (1½"). Spindle taper No. 4. Morse. Table size (dia) 368 mm (14½"). Spindle speeds 180-660 rpm. Main motor: 2 HP.	

Sl. No.	Name of Manufacturer	Product	Make/Model	Specification	Approx. price FOR nearest R.H. Rs
47.	Ex-Cell-O India Ltd, Bombay 18	Vertical Milling machine	Ex-Cell-O 602	Longitudinal travel 635 mm (25"). Work table size 915 x 230 mm (36 x 9"). Spindle speeds 75-2400 rpm. Main motor: 1 HP.	21,160
48.	-do-	Drilling machine	Ex-Cell-O Senior	Drilling capacity (MS) 12 x 12 or 12 x $\frac{1}{2}$ or 6 x 19 mm or 6 x $\frac{3}{4}$". Spindle speeds to suit. Main motor (max): 10 HP.	
49.	-do-	Fine boring machine	Ex-Cell-O 732-Double end	Min dia. of hole bored 6 mm ($\frac{1}{4}$"). No. of spindles to suit. Table area 336 x 1372 mm (13 x 52"). Spindle speeds to suit. Main motor to suit.	
50.	-do-	Fine boring machine	Ex-Cell-O 751-single end	Min dia. of hole bored 6 mm ($\frac{1}{4}$"). No. of spindles to suit. Table area 508 x 1562 mm (20 x 61$\frac{1}{2}$"). Spindle speeds to suit. Main motor to suit.	
51.	-do-	Surface grinding machine	Ex-Cell-O 618	Capacity 150 x 450 x 343 mm high (6 x 18 x 13$\frac{3}{4}$" high). Standard grinding wheel (dia x width) 175 x 13 mm (7 x $\frac{1}{2}$"). Wheel spindle motor: 1 HP.	17,800
52.	-do-	Double ended grinding machine	Ex-Cell-O 144	Grinding wheel 153 mm dia (6" dia). Spindle speed 3000 rpm. Spindle motor: 0.75 HP.	
53.	-do-	Centre lapping machine	Ex-Cell-O 74A	Max dia x length of work 254 x 914 mm (10 x 36"). Max dia stone 25.4 mm (1"). Main motor: 0.5 HP.	
54.	-do-	Facing and centering machine	Ex-Cell-O	Min/Max length of work piece 100, 400 mm (4/16"). Min/Max dia of work piece 12/50 mm ($\frac{1}{2}$"). Max dia of milling cutter 63 mm (2$\frac{1}{2}$"). Milling and drilling motor: 1.5 HP each.	
55.	-do-	Special purpose machine	Ex-Cell-O	Max stroke of hydraulic slide 1015 mm (40"). Spindle speeds to suit. Spindle motor to suit.	
56.	Garlick & Co.(P) Ltd., Bombay-1	Cutting-off machine	Garlick 816	Cutting capacity 200 x 400 mm (8 x 16"). Blade 19 mm wide x 3530 mm long (139" long). Main motor: 0.5 HP.	3,600
57.	G.D. Iron & Steel Works, Batla	Screw & Deep Drawing Presses; Spinning Lathes & Sheet, Working Machinery.			
58.	G.G. Dandekar, Bombay	Radial Drilling Machines, Milling Machines.			
59.	Godrej & Boyce Manufacturing Co. Private Ltd., Bombay-12	Press brake	Godrej GB/80/HH	Tonnage at bottom of stroke 80 tons. Bending capacity 3 x 3000 mm (1/8 x 120"). Main motor: 10 HP.	

Sl. No.	Name of Manufacturer	Product	Make/Model	Specification	Approx. price FOR nearest R.H. Rs
60.	Godrej & Boyce Manufacturing Co. Private Ltd., Bombay 12.	Press brake	Godrej GB/140/30/36	Capacity 140 tons. Bending capacity 6 x 3000 mm (¼ x 120"). Main motor: 15 HP.	
61.	-do-	Power presses	Godrej GP3/16/51	Max tonnage 16 tons. Max stroke 68 mm (2¾"). Dia area (LR x FB) 450 x 350 mm (18 x 14"). Main motor: 2 HP.	
62.	-do-	Power press	Godrej GPI/100/SIG	Max tonnage 100 tons. Max stroke 127 mm (5"). Dia area (LR x FB) 1066 x 686 mm (40½ x 27½"). Main motor: 10 HP.	
63.	-do-	Power press	Godrej GP 5/40/SIG	Max tonnage 40 tons. Max stroke 76 mm (3"). Die area (LR x FB) 686 x 470 mm (27 x 18½"). Main motor: 5 HP.	
64.	-do-	Guillotine shearing machine	Godrej GS 0330	Capacity 3 x 3000 (1/8 x 120"). Strokes per minute 65. Main motor: 5 HP.	60,000
65.	-do-	Guillotine shearing machine	Godrej GS 1230	Capacity 12 x 3000 mm (½ x 120"). Strokes per minute 40. Main motor: 15 HP.	165,000
66.	Grand Foundry, Batala	Band saw, circular saw bench	NEWTON (Woodcutting)	Bow pulleys dia (i) 30" x 36" (ii) 400 mm to 500 mm	
67.	Heroes Engineering Works (P) Ltd. Calcutta	Centre lathe	SP-U/NG-2	Height of centres: 178 mm. Swing over bed: 336 mm. Distance between centres: 940 mm. Spindle speeds (6): 42-615 RPM. Motor: 2 HP, 1440 RPM.	7,830
68.	Hyderabad Allwyn Metal Works, Hyderabad	Metal cutting band saw	ALLCUT	Saw pulley dia 36"	18,750
69.	India Machinery Co Ltd., Calcutta	Cone pulley lathes, drilling machine, milling machines, slotting machine, shaping machines, hacksaw	INDIA - Drilling machine INDIA - Shaping machine INDIA - Slotting machine INDIA - Hacksaw	Capacity 1" & ¾" Stroke 12" & 24" Stroke 7" x 8" Maximum job dia 8"	
70.	Indian Turn-O-Mat Industries, Ludhiana-3	Automatic lathe	Turn-O-Mat AL-25	Max. bar capacity 25 mm (1"). No. of slides 6. Max. long. turning length 50 mm (2"). Spindle speeds (6) 590 - 2200 RPM. Main motor: 3 HP.	14,400
71.	-do-	Special milling machine	Turn-O-Mat RM	Dia of work fixture 325 mm (12¾"). Dia of cutter 100 mm (4"). Spindle speeds (2) 220-280 RPM	-
72.	-do-	Tapping machine	Turn-O-Mat ANT-16	Capacity 6-10 mm (¼-2/5"). Production per hour 2,574/255. Main motor: 1.5 HP.	-

Sl. No.	Name of Manufacturer	Product	Make/Model	Specification	Approx. price FOR nearest R.H. Rs
73.	Industrial Plant Ltd, Calcutta-13	Turret lathe	Industrial plants 3A-11	Max. bar capacity 50 mm (2"). Swing over bed: 410 mm (16.1/8"). Swing over cross slide 200 mm (7.7/8"). Max distance between spindle nose and turret face 500 mm (19.5/8"). Spindle speeds (8) 80-2000 RPM. Main motor: 5 HP.	39,200
74.	Jessop & Co. Ltd., Calcutta	Sheet metal working machinery, cold saw	JESSOP COLD SAW	Saw dia 22" & 34"	42,000 & 47,000
75.	Kerry Jost Tools Ltd., Madras	Radial drilling machine	Kerry E4	Cutting capacity steel: 38 mm. Drilling radius: 1465 mm (7). Main motor: 3 HP.	24,280 (ex-works)
76.	-do-	Pillar drilling machine	Kerry Super 8	Drilling capacity in steel: 19 mm Throat: 195 mm. Nose to base: 1255 mm. Nose to table: 990 mm. Motor: ½ HP.	2,385 (ex-works)
77.	-do-	Bench drill	Kerry Drill Master	Drilling capacity in steel: 13 mm. Throat: 195 mm. Chuck to base: 370 mm. Chuck to table: 190 mm. Motor: ½ HP.	2,185 (ex-works)
78.	-do-	Hacksaw	Saw Master	Cutting capacity for steel 150 mm dia or across flats. Strokes: 130 mm. Speed: 100 & 150 strokes/min. Motor: 3/4 HP.	3,600
79.	K.G. Khosla & Co. Ltd., Gurgaon	Hydraulic presses			
80.	Kirloskar Bros. Ltd., Kirloskarvadi	Drilling machine	Kirloskar 25 mm	Drilling cap in steel 25 mm (1"). Spindle taper No.3 Morse. Table size: (dia) 432 mm (17¼"). Spindle speeds (5) 350 - 2200 RPM. Main motor: 1 HP.	3,900 FOR
81.	-do-	Vertical Boring & Turning machine	Kirloskar-Bullard Dynacut-36 Dynacut-48"	Table dia 915 mm (36"). Max. dia. turbed 1220 mm (48"). Table speeds (20) 8-300 RPM. Main drive motor 40 HP.	-
82.	-do-	Shaping machine	Kirloskar-Butler 28" Super Shaper	Max stroke 660 mm (26"). Range of strokes per minute: 9-100. Main motor: 10 HP.	-
83.	Machinery & Equipment, Ahmedabad	Cone pulley lathes			
84.	Machine Tools Reconditioning Co., Bombay	Lapping machines, abrasive cut-off machines	MTR-Type C/A	Capacity 3" tube, wheel size 16" x 1/8" x 1.1/8" Bore (reinforced) wheel rpm 3800, Motor HP 10.	
85.	Macostels Ltd, Bombay	Tool & cutter grinder			
86.	Madras Machine Tools Ltd., Coimbatore-5	Centre lathe	MMM 250 CI	Swing over bed 500 mm (19¾"). Swing over carriage 360 mm (14.1/8"). Max distance between centres 990 mm (39"). Spindle speeds (8) 35-750 RPM. Main motor: 3 HP.	-

Sl. No.	Name of Manufacturer	Product	Make/Model	Specification	Approx. price FOR nearest R.H. Rs
87.	Madras Machine Tools Ltd., Coimbatore-5	Centre lathe	MTM 170 01	Swing over bed 340 mm (13.3/8"). Swing over carriage 244 mm (19½"). Max distance between centres 700 mm (27½"). Spindle speeds (8) 33-598 RPM. Main motor: 1.5 HP.	
88.	Maya Engineering Works (P) Ltd., Calcutta	Pillar drilling	MDM 401	Drilling capacity in steel: 50 mm. Col to spindle centre: 365 mm. Spindle to table: 375 mm. Motor: 2.25 kW.	8,900
89.	Metro Wood & Engg Works Private Ltd, Ahmedabad	Hydraulic presses			
90.	Mirabal Tools Ltd., Bombay	Mechanical surface grinders			
91.	Mysore Kirloskar Ltd., Harihar	Centre lathe	Kirloskar Shimoga 25	Swing over bed: 500 mm (19¾"). Swing over carriage: 330 mm (13"). Max distance between centres 1000 mm (39.3/8"). Spindle speeds (8) 31-595 RPM. Main motor: 3 HP.	16,304
92.	-do-	Centre lathe	Kirloskar Madras GD-1	Swing over bed 330 mm (13"). Swing over carriage: 210 mm (8¼"). Max distance between centres 600 mm (23-5/8"). Spindle speeds (8) 48-1000 RPM. Main motor: 1 HP.	-
93.	-do-	Centre lathe	Kirloskar Rigiturn	Swing over bed 430 mm (17"). Swing over carriage 250 mm (10"). Max distance between centres 1000 mm (39.3/8"). Spindle speeds (12) 16-750 RPM. Main motor: 5 HP.	24,868
94.	-do-	Centre lathe	Kirloskar, Bombay	Swing over bed 660 mm (26"). Swing over carriage 455 mm (18"). Max distance between centres 2055 mm (81"). Spindle speeds (8) 19-275 RPM. Main motor: 12.5 HP.	-
95.	-do-	Centre lathe	EL 3	Swing over bed 520 mm. Swing over carriage 330 mm. Distance between centres 1060 mm. Main motor: 10 HP. Spindle speeds (18).	20,500
96.	-do-	Turret lathe	Kirloskar Herbert No.4	Max bar capacity 51 mm (2"). Swing over bed 375 mm (14¾"). Swing over cross slide 171 mm (6¾"). Max distance from spindle nose to turret face 743 mm (29¼"). Spindle speeds (8). 40-1000 RPM. Main motor (Two speeds): 7.5 HP.	63,000
97.	-do-	Turret lathe	Kirloskar Herbert No. 9C	Max bar capacity 108 mm (4¼"). Swing over bed 572 mm (22½"). Swing over cross slide 317 mm (12½"). Max distance from spindle nose to turret face 1505 mm (59¼"). Spindle speeds (32) 22-600 RPM. Main motor (Two speeds): 25/7 HP.	181,378

Sl. No.	Name of Manufacturer	Product	Make/Model	Specification	Approx. price FOR nearest R.H. Rs
98.	Mysore Kirloskar Ltd., Harihar	Cutting-off machine	Kirloskar cobra No. 12	Capacity: square or rounds at 90° 300 mm (12"). Square or rounds at 45° 180 mm (7.1/8"). Stroke of bow 200 mm (8"). Strokes per minute 60 and 80. Main motor drive: 2 HP.	9,413
99.	Nagina Foundry, Batala	Power presses			
100.	National Electrical Industries, Bombay 12	Pedestal grinder	NE I	Wheel dia (16") 406 mm. Spindle speed 1200 RPM. Motor: 2.75 HP, 1440 RPM.	1,854
101.	New Bemco Engg Products (P) Ltd., Belgaum	Power press	Bemco BVT 10 x 200	Capacity 10 tons. Table size: 450 x 385 mm (18 x 15"). Throat depth 205 mm (8.1/8"). Max ram stroke 395 mm (15.3/4"). Main motor: 3 HP.	-
102.	-do-	Power press	Bemco 100 HYP 15/24	Capacity 100 tons. Platen size 610 x 610 mm (24.3/8 x 24.3/8"). Max No. of platens - 4. Max ram strokes 381 mm (15.1/8"). Main motor: 10 HP.	-
103.	-do-	Power press	Bemco HPBX	Capacity 10 tons. Table size: 450 x 385 mm (17¾ x 15"). Max strokes 400 mm (15¾"). Main motor: 3 HP.	-
104.	-do-	Power press	Bemco FFX	Capacity 100 tons. Table size: 600 x 600 mm (24 x 24"). Max strokes 500 mm (20"). Main motor: 10 HP.	-
105.	New Bharat Engineering, Jamnagar	Radial drilling machines			
106.	New Bijli Foundry, Batala	Cone pulley lathes			
107.	New Standard Engineering Co.Ltd., Bombay 63.	Drilling machine	NSE Pratap	Drilling capacity in steel 40 mm (1½"). Spindle taper No.4. Morse table size (dia) 385 mm (15") Spindle speeds (infinite) 76-800 RPM. Main motor: 3 HP.	8,540
108.	-do-	Threading machine	NSE HEAT UR-4"	Min/Max dia threaded 6-104 mm pipe (¼-4" pipes). 6-52 mm bolts (¼-2" bolts). Max length threaded 190 mm (7½"). Spindle speeds (4) 6-37 RPM. Main motor: 3 HP.	12,270
109.	-do-	Threading machine	NSE HEAP U-2"	Min/Max dia, threaded 6-54 mm pipe (¼-2" pipes) 6-38 mm bolts. Max length threaded 125 mm (5"). Spindle speeds (2) 14-28 RPM. Main motor: 1.5 HP.	14,120
110.	-do-	Cutting-off machine	NSE H-18	Cutting capacity 335 mm rounds (9"). Cutting speed 80/103 strokes per minute. Size of blade (L x W) 450 x 37 mm (81 x 1½"). Main motor: 2 HP.	4,700
111.	-do-	Power hammer pneumatic	MASSEY/NSE 10 Cwt	Capacity of falling weight 500 kgs(1100 lbs). Max stroke 685 mm (27"). Dia of ram 320 mm (12½"). Blows per minute 110. Main motor: 60 HP.	143,400

Sl. No.	Name of Manufacturer	Product	Make/Model	Specification	Approx. price FOR nearest R.H. Rs
112.	New Standard Engineering Co.Ltd., Bombay 63.	Power hammer friction	MASSEY/NSE 10 Cwt	Capacity of falling weight 500 kgs (1100 lbs). Max stroke 1675 mm (66"). Max weight of top die 200 kgs (440 lbs). Main motor: 20 HP.	
113.	New Zamindar Foundry, Batala	Power presses			
114.	Oriental Electric & Engg. Co., Calcutta	Radial drilling machine	ORIENTAL TOWN AE 4	Drilling capacity in steel 50 mm. Max drilling radius: 1400 mm. Spindle motor: 5 HP.	39,500
115.	Parmar Mechanical Works, Bombay	Centre lathe	Parmar RMP No. 3	Swing over bed 305 mm (12". Swing over carriage 180 mm (7"). Max distance between centres 1067 mm (42"). Spindle speeds (8) 20-750 RPM. Main motor: 1.5 HP.	
116.	Pearl Mechanical Engineering Co., Ludhiana	Centre lathe	Pearl Wolff's	Swing over bed 355 mm (14"). Swing over carriage 241 mm (9½"). Max distance between centres 1143 mm (45"). Spindle speeds (16) 15-575 RPM. Main motor: 1.5 HP.	
117.	-do-	Centre lathe	Pearl Wolff's 10	Swing over bed 400 mm (15¾"). Swing over carriage 280 mm (11"). Max distance between centres 1000 mm (39.3/8"). Spindle speeds (8) 15-575 RPM. Main motor: 5/7.5 HP.	14,950
118.	Prem Engineering Works, New Delhi	Power press, guilotine shearing machines	OMB	Width 36", 48" and 72", thickness 1/8", 5/32" & 3/16", Motor 5, 7.5 & 10 HP.	6,355, 8,200 & 16,475
119.	PSG Industrial Institute, Coimbatore	Centre lathe	PSG 180	Swing over bed 420 mm (16½"). Swing over carriage 320 mm (12-5/8"). Max distance between centres 1000 mm (39-3/8"). Spindle speed (8) 42-760 RPM. Main motor: 3 HP.	9,525
120.	-do-	Centre lathe	PSG 141	Swing over bed 355 mm (14"). Swing over bed carriage 200 mm (7-7/8"). Max distance between centre 750 mm (29½"). Spindle speeds (16) 24-1000 RPM. Main motor(Two speeds): 1.5/3 HP.	9,750
121.	RK Machine Tools, Ludhiana	Centre lathe	RK POM	Bed length: 3,660 mm. Main motor: 7½ HP.	36,900
122.	-do-	Vert. milling machine	RK	Table size: 1220 x 280 mm. Working size: 1000 x 240 mm. Long. traverse: 505 mm. Vert. traverse: 450 mm. Trans. traverse: 254 mm. Main motor: 5 HP.	31,850
123.	-do-	Horiz. milling machine	RK MM 12-3	Table size 1220 x 280 mm. Working size: 1000 x 240 mm. Long. traverse: 505 mm. Vert. traverse: 505 mm. Trans. traverse: 254 mm. Spindle speeds (12): 30-608 RPM. Main motor: 5 HP.	32,850

Sl. No.	Name of Manufacturer	Product	Make/Model	Specification	Approx price FOR nearest R.H. Rs
124	RK Machine Tools, Ludhiana	Universal Milling Machine	RK UM12-3	Table size 1220 x 280 mm. Working size 1000 x 240 mm long. Traverse 505 mm, Vertical traverse 505 mm. Trans. traverse 254 mm. Spindle speeds (12): 30-608 rpm. Main motor 5 HP	22,850
125	- do -	Surface grinder	RK	Working surface: 864 mm x 203 mm. Grinding capacity 505 x 140 mm. Grinding wheel: 152 o.d. Spindle speed: 2800 rpm. Main motor: 3 HP	11,800
126	- do -	Shaping machine	RK	Stroke 600 mm	8,350
127	- do -	Slotting machine	RK	Working table: 500 mm dia. Stroke 8 to 228 mm. Length of ram bearing surface: 810 mm. Size of slots: 18 mm. Max dia of job: 812 mm Motor 5 HP	50,000
128	Rohtak Industries Ltd, Bombay	Polishing machine			
129	Sagar Engineering Works, Ludhiana	Shaping machines	SM-24	Max length of ram stroke 24", range of strokes/minite 12-24-40-72. Table size 19" x 13" x 13", Motor output: 3 HP, 1000 rpm	
130	Sant Engineering Works, Jullunder	Planing machine	CHAMPION	Planing dimensions: 48" x 24" x 24"; 72" x 30" x 30"; 96" x 39" x 39".	
131	Scottish Indian Machine Tools Limited, Thana	Shearing machine	Simtools	Max thickness of sheet 13 mm (½"). Strokes per minute 25. Main motor 25 HP	
132	Shree Hanuman Industries, Calcutta	Power Presses, Guillotine Shearing Machines, Press Brakes	SHI	Capacity 20 - 60 tons	
133	Shree Mahalaxmi Engineering Works, New Delhi	Pillar drilling machine	SWIFT	Drilling capacity in steel 52 mm, Distance between centres of spindle and column: 314 mm. Max distance spindle to table 597 mm. Spindle to base : 1092 mm. Motor 5 HP	8,900
134	- do -	Bench drilling machine	SWIFT	Drilling capacity in steel 12 mm. Distance between spindle centre to column: 190 mm, chuck to table 290 mm, chuck to base 473 mm	1,175
135	Shree Saraswati Iron Foundry Bangalore	Power presses, guillotine shearing machines	TV 60 - Inclinable power press	Max capacity 60 tons	
136	Sterling hydraulic company, Bombay	Hydraulic presses			
137	Supercrafts (P) Limited, Calcutta - 42	Centre lathe	Super crafts GH215/1500	Swing over bed 430 mm (17"), swing over carriage 236 mm (9¼"). Max distance between centres 1500 mm (59"). Spindle speeds (12) 15-750 or (20) 20-1000 rpm. Main motor 5 HP	

Sl. No.	Name of Manufacturer	Product	Make/Model	Specification	Approx price FOR nearest R.H. Rs
138	Tata Engineering & Locomotive Company Limited, Chinchwad	Column drilling/boring machine	CD-40	Drilling capacity in steel 40 mm. Spindle speeds (12): 32-1400 rpm. Motor 4/5.5 kW	34,000 Ex-works
139	- do -		CD-25	Drilling capacity in steel 25 mm. Spindle speeds: 63-1000 rpm. Drilling motor 2.5 HP	21,950 Ex-works
140	Texmaco Limited, Belghoria	Turret lathe	Texmaco-Ward No. 3C	Max bar 50 mm (2"). Swing over bed 375 mm (14¾") Swing over cross slide 230 mm (9")	
141	Textool Company Limited, Coimbatore	Centre lathes			
142	TRAUB (India) Limited, Poona	Automatic lathe	Traub A-25	Max bar capacity 25 mm (1"). Max long. turning length 70 mm (2¾"), Spindle speeds (12) 550-4000 rpm. Main motor 1.6/2.1 HP	24,110
143	Universal Screw Factory, Amritsar	Screw Making Machinery, Cold Headers etc			
144	V.A.P. Corporation Ltd, Bombay	Surface grinders			
145	Vinod Industries Ltd, Faridabad	Tool & Cutter Grinders	VINOD	Swing over table 280 mm, admit between centres 690 mm	17,066

NOTE:

(1) Complete range of products of all the manufacturers has not been covered in this list, only representative machines have been taken.

Appendix - 13

Major Types and Size Ranges of Indian Machine Tools

Centre lathes	280 mm to 660 mm swing, upto 3000 mm between centres
Centre lathes, heavy duty	1000 mm to 3000 mm swing, upto 12000 mm between centres
Turret lathes	10 to 108 mm bar capacity
Automatic lathes	15 to 42 mm bar capacity
Milling machines	120 x 483 mm to 355 x 1600 mm table
Drills	13 to 50 mm hole in steel and radials upto 2830 mm arms
Heavy duty radial drill	80 to 100 mm hole in steel upto 3000 mm
Tapping & threading machines	6 to 76 mm bolts
Vertical boring and turning machines	Upto 4000 mm max dia turned
Horizontal boring & milling	80 mm to 160 mm spindle diameter
Cylindrical grinding machines	260 mm dia x 355 mm c/c to 350 mm dia x 2075 mm c/c
Roll grinding machines	400 mm to 800 mm dia
Surface grinding machines	450 x 150 mm to 250 x 1500 mm work surface
Tool and cutter grinder	200 mm swing x 250 mm c/c to 305 mm swing x 480 mm c/c
Double ended grinders	Upto 1050 mm wheel dia
Planing machines	690 x 660 mm to 1600 x 1600 mm workpiece and table length upto 12000 mm

Gear cutting machines	Upto 250 mm dia
Cut-off machines, hacksaws and bandsaws	Upto 300 mm dia
Abrasive	Upto 76 mm dia
Shaping machine	305 to 760 mm stroke
Slotting machine	160 to 250 mm stroke
Press brakes	25 to 140 tons 1.6 x 1575 mm to 3x 3000 mm
Edge planing	80 mm thickness and 12000 mm length
Power presses (mechanical and hydraulic)	10 to 400 tons
Plate bending tolls	2 x 1220 to 13 x 2500 plate size
Shears	3.15 x 2500 to 13 x 2500 mm

Appendix - 14

Complete List of Grade I Manufacturers and Items Manufactured With and Without Foreign Collaborations

	Centre Lathes	Turret Lathes	Roll Turning Lathes	Automatic Lathes	Copying Lathes	Milling Machines	Drilling Machines - Radial	Drilling Machine	Tapping & Threading Machine	Vertical Turning & Boring Machine	Fine Boring Machine	Grinders - Cylindrical	Grinders - Surface	Tool & Cutter Grinder	Double Ended Grinding Machine	Planing Machine	Gear Cutting Machine	Cut-Off Machine	Shaping & Slotting Machine	Machine Tools - Miscellaneous	Press Brakes	Power Presses - Mechanical	Power Presses - Hydraulic	Plate Bending Rolls	Shearing Machines - Guillotine	Miscellaneous Metal Forming Machines	Transfer Lines	Horizontal Boring Machines
Supercraft	I																											
Surat Engineering																			I									
Texmaco		F																										
Traub (India) - 1964				✓F 5-40%																								
Turn-O-Mat				I		I			I																			
Jessop							I											I										
REM	I					I							I						①② I									
B.S. Pederson						F																						
Telco - 1967	$\boxed{\text{I}}$							I																				
Pusco								I																				
Jost Kerry							F	F										F										
Oriental Electric							F																					
Hanuman Industries																						I						

① Shaping Machine
② Slotting Machine

LEGEND

◎ High Production
□ Prototype
Ⓔ Export Right Exists
△ No Export Right or Limited Right

Appendix - 15

Major Standards Published by Indian Standards Institution for Machine Tools

Standard	ISI Code No. IS:
Code of Testing Machine Tools	2063-1962
Coolant Pumps for Machine Tools	2161-1962
Feeds for Machine Tools	2219-1962
Lathes (Upto 800 mm swing over bed), Test Chart for	1878-1961
Lathes, Sizes for General Purpose	2392-1963
Milling Arbors	2168-1963
Overall Internal Heights for Lathe Tool Posts	1995-1962
Speeds for Machine Tools	2218-1962
Symbols to be Given on Indication Plates on Machine Tools, Recommendations for	2182-1962
Test Chart for Bench Drilling Machines	2426-1963
Test Chart for Box Column Drilling Machines	2367-1963
Test Chart for Cylindrical Grinders	2368-1963
Test Chart for Horizontal and Universal Milling Machines	2200-1962
Test Chart for Radial Drilling Machines	2199-1962
Test Chart for Pillar Type Drilling Machines	2425-1963
Test Chart for Shaping Machines	2310-1963
Test Chart for Slotting Machines	2308-1963
Test Chart for Under Crank Type Shearing Machine and Guillotines	2515-1963
Test Chart for Vertical Milling Machines	2201-1962
Test Chart for Bench Grinders	2538-1963
Sizes of Machine Tools Tables	2642-1964
Test Chart for Horizontal Surface Grinders	2743-1964
Test Chart for Bench Grinders	2538-1963
Direction of Operation of Controls for Machine Tools, Recommendations for	2987-1965
Single and Double Column Planing Machines, Test Chart for	2877-1964
Universal Tool and Cutter Grinders, Test Chart for	3080-1965
Power Hacksaw Machines (Upto 300 mm round bar capacity), Test Chart for	3405-1966

Appendix - 16

Total Transport Cost on Export of Machine Tools - A Case Study for Export to USA (East Coast) from India, Japan and U.K.

Country of Manufacture	Transport Cost per Machine Tool Package(1)															
	As at Present								With Recommendations Implemented							
	India (Bangalore)		India (Batala)		Japan		U.K. (Colchester)		India (Bangalore) (with equitable ocean freight rate)		India (Bangalore) (with promotional ocean freight rate)		India (Batala) (with equitable ocean freight rate)		India (Batala) (with promotional ocean freight rate)	
		$		$		$		$		$		$		$		$
Seaworthy Packing																
Timber(2) - approx. 1.11 cu m		85.40		85.40		85.40		85.40		85.40		85.40		85.40		85.40
Alkathene sheets ..		10.65		10.65		3.50		3.50		4.00(8)		4.00(8)		4.00(8)		4.00(8)
Galvanised plain sheets ..		9.00		9.00		5.32		5.32		6.00(8)		6.00(8)		6.00(8)		6.00(8)
Misc items & misc labour, say		4.00		4.00		4.00		4.00		4.00		4.00		4.00		4.00
		110.05		110.05		98.22		98.22		99.40		99.40		99.40		99.40
Inland Transport																
International port of despatch ..	Bombay		Bombay		Yokohama		London		Bombay		Bombay		Kandla(10)		Kandla(10)	
Lead to port, km	1,027		1,905		100		200		1,027		1,027		1,643		1,643	
Road transport rate - $/ton(3)	27.4		50.8		2.0		4.0		13.7(9)		13.7(9)		21.90(9)		21.90(9)	
Road transport cost per machine(4)		65.70		122.00		4.80		9.60		32.80(9)		32.80(9)		52.50(9)		52.50(9)
Crane hire charge, $/lift(5)	9.6		9.6		14.4		14.4		9.6		9.6		9.6		9.6	
Number of crane lift ..	3		3		1		1(11)		1(11)		1(11)		1(11)		1(11)	
Total crane hire charges ..		28.80		28.80		14.40		14.40		9.60		9.60		9.60		9.60
Total inland transport cost(6)		94.50		150.80		19.20		24.00		42.40		42.40		62.10		62.10
Ocean Freight																
Distance to New York - ..	8,153 Via Suez		8,153 Via Suez													
nautical miles	11,385		11,385		9,700		3,130									
Ocean freight rates																
i) Basic $/cu m ..	63.75		63.75		65.4		36.9		42.7(12)		29.5(12)		42.7(12)		29.5(12)	
ii) Heavy lift $/cu m ..	2.45		2.45		nil		nil		nil(12)		nil(12)		nil(12)		nil(12)	
Ocean freight																
i) Basic ..		440.00		440.00		452.00		254.60		294.63		206.00		294.63		206.00
ii) Heavy lift(4) ..		16.90		16.90		-		-		-		-		-		-
iii) Cape diversion surcharge @ 15%.		68.50		68.50		-		-		44.20		30.90		44.20		30.90
Total ocean freight ..		525.40		525.40		452.00		254.60		338.83		236.90		338.83		236.90
Total Transport Cost(7) ..		729.95		786.25		569.42		376.82		480.63		378.70		500.33		398.40
FOB value of m/c tool package		2,100		2,100		4,750		4,750		2,100		2,100		2,100		2,100
Total incidence of transport cost assuming uniform FOB value of $ 2,100 ..		34.8%		37.5%		27.1%		17.95%		22.9%		18.1%		23.8%		18.9%
Total incidence of transport cost assuming uniform FOB value of $ 4,750 ..		15.4%		16.5%		11.89%		7.73%		10.1%		8.0%		10.5%		8.4%
Total incidence of transport cost on respective FOB values		34.8%		37.5%		11.89%		7.73%		22.9%		18.1%		23.8%		18.9%

NOTES:

Assumptions

(1) Identical machine tool (with identical packing cases) is exported from India, U.K. and Japan, but the Indian case does not carry any electricals and accessories.

(2) Packed volume of the machine is 6.9 cu m and the quantity of packing timber required is 1.11 cu m in all cases as the size of packing, the thicknesses of planks and battens are same.

(3) Road transport cost for machine tool cases per ton-km is 2.7 cents(20 paise) in India and 2 cents in U.K. and Japan due to lower taxes and use of truck-trailer combinations.

(4) Gross weight of the package is 2.4 tons for India as also for U.K. and Japan as the additional weight due to electricals and accessories in foreign packages is offset by reduction in the weight of packing case due to use of lighter species of timber.

(5) Crane hire charge at docks is $ 4 per ton per lift for India and $ 6 per ton per lift in U.K. and Japan

(6) Fees and commisions of clearing agents at ports (which are approximately 3.5% of the FOB value for Indian ports) have been excluded from comparison.

(7) Inland transport charges in the country of destination and inland and marine insurance premium have been omitted from comparison. However, their inclusion is likely to widen the disparity of incidence.

Recommendations

(8) Galvanised plain (G.P.) plain sheets and alkathene sheets required for packing should be supplied at internal prices to the exporter.

(9) Drawback at the rate of 50 per cent of the road transport cost for forwarding the machine tool to the port has been assumed for the purpose of quantifying the effect of implementation of recommendations.

(10) Development of communications with the hinterland of Kandla port should be expedited to reduce lead from north-west India to the major Indian port.

(11) The port authorities should streamline the procedures at the port so that the machine tool exporter does not have to pay crane hire charges more than once.

(12) The ocean freight structure on trade routes from India is rationalised and equitable or promotional freight rates are to be introduced. The promotional freight rate is calculated at $ 5.5 per cubic metre plus 8 per cent ad valorem (with respect to FOB value). Heavy lift rate is deleted up to 3,530 kg (i.e. 8,000 lbs) weight.

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